# National Evaluation of Early Reading First

Final Report to Congress

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# National Evaluation of Early Reading First

**Final Report**

**MAY 2007**

**Russell Jackson, Project Director**
**Ann McCoy**
**Carol Pistorino**
**Anna Wilkinson**
Decision Information Resources, Inc.

**John Burghardt, Principal Investigator**
**Melissa Clark**
**Christine Ross**
**Peter Schochet**
Mathematica Policy Research

**Paul Swank**
Center for Improving the Readiness of Children for Learning and Education

**Stefanie R. Schmidt, Project Officer**
Institute of Education Sciences

**U.S. Department of Education**
Margaret Spellings
*Secretary*

**Institute of Education Sciences**
Grover J. Whitehurst
*Director*

**National Center for Education Evaluation and Regional Assistance**
Phoebe Cottingham
*Commissioner*

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# Acknowledgments

# Disclosure of Potential Conflicts of Interest[1]

The research team for this evaluation consists of a prime contractor, Decision Information Resources (DIR), Inc., and two subcontractors, Mathematica Policy Research (MPR), Inc. and the Center for Improving the Readiness of Children for Learning and Education (CIRCLE) at the University of Texas-Houston Health Sciences Center. DIR and MPR have no interests that could be affected by findings from the evaluation of the Early Reading First (ERF) program.

CIRCLE developed one of the study's classroom observation measures and advised on the selection of the child assessments. CIRCLE also trained DIR staff to collect classroom observation and child assessment data, but CIRCLE staff did not collect any data. They scored the classroom observations and child assessments by entering item-level data into computer programs, but they did not know the treatment or control status of the classrooms for which they entered data. CIRCLE carried out descriptive analyses of the classroom observation data that was incorporated into the report, but had no role in the impact analyses in the report. Under a separate contract with an ERF grantee that was part of the 2003 cohort in the study, CIRCLE provided services to and conducted the grantee's local evaluation as required under its grant. Under another separate contract with an ERF grantee that was part of the 2005 cohort and not in the study, CIRCLE provided technical assistance on the use of its classroom observation measure. In addition, CIRCLE has adopted a public position supporting early childhood classroom activities and instructional materials and seeks funding to provide services that are consistent with the goals of the Early Reading First program.

A consultant to DIR, Professor Christopher Lonigan of Florida State University, provided an assessment that was used in a battery of assessments for the evaluation. Dr. Lonigan's role in the DIR project was to review and provide feedback on the preliminary results of the study and to provide information on the psychometric properties of the assessment he developed. Dr. Lonigan had previously developed the assessment and he had no role in the selection of assessments. The assessment was not commercially available at the time it was selected by DIR and during the data collection phase. A revised version of the assessment became commercially available as the Test of Preschool Early Literacy (TOPEL) in January 2007, after the ERF data collection. Dr. Lonigan has a financial interest in the commercial version. Under a separate contract, Dr. Lonigan was commissioned by the Early Reading First Program Office to provide lectures on components of effective instruction in phonemic awareness at meetings of Early Reading First grantees in April 2006 and April 2007 after the preliminary descriptive findings of the report were shared with the grantees. Dr. Lonigan was also commissioned by the Early Reading First Program Office to provide a lecture on the preliminary findings of the National Early Literacy Panel in October 2004.

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[1] Contractors carrying out research and evaluation projects for IES frequently need to obtain expert advice and technical assistance from individuals and entities whose other professional work may not be entirely independent of or separable from the particular tasks they are carrying out for the IES contractor. Contractors endeavor not to put such individuals or entities in positions in which they could bias the analysis and reporting of results, and their potential conflicts of interest are disclosed.

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# Executive Summary

The No Child Left Behind (NCLB) Act of 2001 created the Early Reading First (ERF) program to enhance teacher practices, instructional content, and classroom environments in preschools and to help ensure that young children start school with the skills needed for academic success. This discretionary grant program provides funding to preschools that particularly serve children from low-income families so that the preschools can support age-appropriate development of children's language and literacy skills. The program, which was authorized under Title I, Part B, Subpart 2 of the Elementary and Secondary Education Act (ESEA) as reauthorized by NCLB, reflects the research of the last several years about the kinds of skills that young children must have to become successful readers. These skills include oral language (expressive and receptive language and vocabulary development), phonological awareness (rhyming, blending, segmenting), awareness of the print conventions, and alphabet knowledge (letter recognition) (Whitehurst and Lonigan 2001; Pullen and Justice 2003).

The NCLB Act also mandated an independent national evaluation of the ERF program and required a final report to Congress. This final report presents the impacts of the program on the language and literacy skills of children and on the instructional content and practices in preschool classrooms.

The main findings of the national evaluation of ERF are that the program had positive, statistically significant impacts on several classroom and teacher outcomes and on one of four child outcomes measured. Specifically, ERF had positive impacts on

- the number of hours of professional development that teachers received and on the use of mentoring as a mode of training

- aspects of classroom environments and teacher practices that were major focuses of the ERF program, including

  o language environment of the classroom
  o book-reading practices
  o the variety of phonological-awareness activities and children's engagement in them
  o materials and teaching practices to support print and letter knowledge and writing
  o the extensiveness and recency of child-assessment practices

- other, more general aspects of classroom quality, including the quality of teacher-child interactions, the organization of the classroom, and the planning of activities for children.

With regard to child outcomes, ERF had a positive impact on children's print and letter knowledge but not on phonological awareness or oral language.

ERF neither enhanced nor diminished children's social-emotional development during the preschool year. Patterns of results that were observed for the overall sample were also observed for most subgroups examined.

## Study Background

*Preventing Reading Difficulties in Young Children* (National Research Council 1998) shows that a high percentage of children from low-income families attend preschools that may successfully address other developmental domains but often fail to provide the language, cognitive, and early-reading instruction and activities necessary to develop skills to become successful readers. Improving the instructional program to support the age-appropriate development of these skills is the central focus of ERF.

ERF provides grants to school districts, other public, nonprofit, and private organizations, and collaborations of the same entities that serve 3- to 5-year-olds, especially those from low-income families. The grants must be used to provide services that will better prepare children to enter kindergarten with the necessary language, cognitive, and literacy skills that can avert reading difficulties. ERF grants are intended to support the following items:

- A high-quality oral language and print-rich classroom environment

- Activities and instructional materials developed according to scientifically based reading research that will help develop children's oral language, phonological awareness, print awareness, and alphabet knowledge

- Screening and assessments to monitor children's acquisition of skills and to guide instruction

- Professional development formulated according to scientifically based reading research that will help teachers to enhance children's language, cognitive, and early literacy skills

- Integration of the instructional materials, activities, tools, and measures into the grantee's existing programs

Two key elements of ERF are the use of scientifically based methods and the goal of enhanced professional development. Scientifically based reading research is defined as that which applies rigorous, systematic, and objective procedures to obtain valid and reliable knowledge relevant to reading development, reading instruction, and reading difficulties. Consistent with the statutory definition of "professional development," ERF professional development was expected to be continuous, intensive, and classroom focused.

Five rounds of ERF grants have been awarded since the program began in 2002. These awards ranged from $750,000 to $4.5 million per site for a 3-year period. The national evaluation of ERF focused on the second cohort of grantees from FY 2003, in which the grants totaled approximately $75 million; the average award was $2.5 million, and individual awards ranged from $1,074,846 to $4,358,750 to be spent over three years.

The national evaluation of ERF was intended to investigate the effects on children's language development and emergent literacy when:

- preschools receive funding to adopt scientifically based methods and materials

- teachers are provided with focused professional development that supports the use of these materials and methods

The following research questions were addressed by the evaluation:

- What is the impact of ERF on the language and literacy skills of children enrolled in preschools that receive ERF support?

- What is the impact of ERF on the quality of language and literacy instruction, practice, and materials that preschools provide?

- To what extent are variations in ERF program quality and implementation associated with differences in the language and literacy skills of the children served?

## Study Design

The study uses a regression-discontinuity (RD) design to assess the impact of ERF funding and program support for preschools on the language and literacy preparedness of preschool children. This study design takes advantage of the fact that the U.S. Department of Education (ED) is required to follow a formal, structured process for selecting grantees to receive ERF funding. In its published announcement of the availability of ERF grants for FY 2003 (*Federal Register* of March 11, 2003), ED established criteria for scoring each application received. Independent reviewers used these criteria to review and score applications. ED then awarded ERF grants to the grant applicants with the highest application scores, progressing down the score distribution until all funding available for the fiscal year had been allocated. In this way, 30 grants were awarded to the grant applicants with scores of at least 74; applicants with scores below 74 were not awarded grants. Impact estimates were obtained by comparing child outcomes and teacher practices in funded sites to those in unfunded sites, controlling for a smooth function of the application score.

The final evaluation sample was composed of a treatment group, which consisted of 4-year-olds attending preschool in 28 of 30 ERF grantee sites, whereas the comparison group consisted of children attending preschool in 37 of the 67 unfunded applicant sites that had the highest application scores and that agreed to participate in the study. Approximately three classrooms were selected from each participating site with probabilities proportional to the number of eligible students in each class (see Table 1). The study team randomly selected approximately 11 4-year-old students per classroom whose parents had provided written consent for participation in the study.

Table 1. Sample sizes for National Evaluation of ERF

| Unit of Analysis | Funded sample size | Unfunded sample size | Total |
|---|---|---|---|
| ERF grantees/unfunded applicants | 28 | 37 | 65 |
| Preschools | 86 | 75 | 161 |
| Classrooms observed | 78 | 91 | 169 |
| Teachers surveyed | 92 | 102 | 205 |
| Children assessed | 803 | 855 | 1,658 |

The study team collected data for the evaluation from several sources. Trained staff directly assessed the language and literacy skills of children participating in the study. Trained observers measured classroom practice in a subsample of study classrooms. The teachers of all children in the sample and the director or principal of each preschool participating in the study completed a self-administered questionnaire. Teachers of the sampled children were also asked to rate each child's social-emotional behavior. The study team also obtained data from the preschools about children's school attendance for the 2004–2005 year. Finally, parents of the sampled children were interviewed by telephone.

Data were collected at two times: fall 2004 and spring 2005. The same data-collection instruments and procedures were used in the funded and unfunded sites.

**Child Assessments.** Table 2 shows the instruments that were used to measure children's language and literacy skills in three domains (print and letter knowledge, phonological awareness, and oral language) and their social-emotional behavior.

Table 2. Data-collection instruments: child assessments

| Instrument name | Domain measured | Psychometric information from published sources |
|---|---|---|
| (Pre-LAS)[1] | English proficiency screening | Internal consistency reliability = .86–.90 |
| Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP)[2] | Print and letter knowledge | Test of Preschool Early Literacy (TOPEL): <ul><li>Internal consistency reliability = .95</li><li>Test-retest reliability = .89</li></ul> |
| | Elision[3] | Internal consistency reliability = .71–.88 |
| Expressive One-Word Picture Vocabulary Test (EOWPVT)[4] | Expressive vocabulary | <ul><li>Internal consistency reliability coefficients = .96–.98</li><li>Test-retest reliability = .95</li></ul> |
| Preschool Language Scale (PLS-4)[5] | Auditory comprehension | <ul><li>Test-retest reliability = .83–.91</li><li>Internal consistency reliability coefficients = .83–.90</li></ul> |
| Social Competence & Behavior Evaluation (30-item)—Teacher Rating[6] | <ul><li>Social competence</li><li>Anger-aggression</li><li>Anxiety-withdrawal</li></ul> | Internal consistency reliability coefficients = .85–.92 |

[1] Duncan, S. E., and DeAvila, E. A. (1998). *Pre-LAS 2000*. Monterey, CA: CTB/McGraw-Hill.

[2] Lonigan, C., Wagner, R., Torgesen, J., and Rashotte, C. (2007). *The Test of Preschool Early Literacy (TOPEL)*. Austin, TX: PRO-ED.

[3] Internal-consistency reliability coefficients of Elision subtest from unpublished tabulations using data from the Head Start Impact Study (U.S. Department of Health and Human Services 2005), and the forthcoming Even Start Classroom Observations and Interventions and Preschool Curriculum Evaluation Research studies, both being conducted by IES.

[4] Brownell, R. (2000). *Expressive One-Word Picture Vocabulary Test Manual*. Novato, CA: Academic Therapy Publications.

[5] Zimmerman, I. L., Steiner, V.G., and Pond, R.E. (2002). *Preschool Language Scale-4th Edition, Examiner's Manual*. San Antonio, TX: The Psychological Corporation.

[6] La Freniere, P. J., and Dumas, J. E. (1996). "Social competence and behavior evaluation in children ages 3 to 6 years: The short form (SCBE-30)," *Psychological Assessment, 8,* 369–377.

**Classroom observations and surveys**. Classroom practice and overall quality of the preschool classrooms were measured by two observation instruments—the Teacher Behavior Rating Scale (TBRS)[2] and 11 items from the Early Childhood Environment Rating Scale-Revised (ECERS-R) that form the Teaching and Interactions Subscale.[3] Trained members of the study team conducted the classroom observations.

[2] Landry et al. (2004). "Teacher Behavior Rating Scale (TBRS)," unpublished research instrument.

[3] Harms, T., Clifford, R.M., and Cryer, D. (1998). *Early Childhood Environment Rating Scale: Revised Edition*. NY: Teachers College Press, and Clifford, R.M., Barbarin, O., Chang, F., Early, D., Bryant, D., Howes, C., Burchinal, M., and Pianta, R. (2005). "What Is Pre-Kindergarten? Characteristics of Public Pre-Kindergarten Programs." *Applied Developmental Science*, vol. 9, no. 3, pp. 126–143.

The evaluation team also developed self-administered surveys that the teachers and preschool principals or directors completed in the fall of 2004 and spring 2005. Parents of children in the study were interviewed through computer-assisted telephone interviewing. The team conducted in-depth telephone interviews with grantee directors for each of the 28 funded grantees to learn about their use of ERF funds, including challenges encountered and notable successes.

**Impact estimation and hypothesis testing.** Impact estimates were obtained by comparing child outcomes and teacher practices in funded sites to those in unfunded sites, controlling for a smooth function of the application score. If the application score fully reflects the selection rule used to award ERF grants and we control for the correct function of the score, this approach produces unbiased estimates of the effect of ERF.

We adopted a 2-tailed hypothesis test because it was unclear before the evaluation whether ERF funding would improve all outcomes. For each outcome, the findings indicate the statistical significance of the impact estimates at the 5-percent level. The analysis methods accounted for the fact that some outcome domains contained multiple measures. The tables presented include checkmarks for domains in which impacts are jointly statistically significant once the adjustment for multiple comparisons is made. The tables also include p-values for tests of statistical significance of individual outcomes that do not reflect adjustments for multiple comparisons. The conclusions are unaffected when adjustments for multiple comparisons are applied.

The following sections contain findings about

- characteristics of ERF children and preschools
- ERF impacts on teachers and classroom practices
- ERF impacts on children's language and literacy skills and social-emotional outcomes

The evaluation also estimated ERF impacts for several subgroups defined by key characteristics of children, preschools, and teachers.

## Characteristics of ERF Children and Preschools

**Characteristics of children.** ERF participants appeared to be more disadvantaged than the national average. A relatively large proportion of children served by ERF grantees had some characteristics associated with disadvantage. More than one-third of the ERF sample reported monthly income of less than $1,500, compared to 17 percent of households with 3- to 5-year-olds nationally. Children in this cohort were also more likely than children nationally to come from single-parent households (40 percent compared to 28 percent), be Hispanic (46 percent compared to 21 percent), and have foreign-born parents (39 percent compared to 23 percent). About 4 out of 10 ERF parents (41 percent) reported that the primary language spoken in the home was something other than English. Initial scores on three standardized assessments suggest that children were functioning below national norms (which were standardized to be 100 on all three tests) when they entered the ERF program. ERF participants scored an average of 94 on test of print and letter knowledge, 91 on a test of auditory comprehension (an oral language measure), and 83 on a test of expressive vocabulary (another oral language measure).

**Characteristics of preschools.** The vast majority of ERF preschools (95 percent) combined ERF funding with other government funding sources, which was consistent with the goal of the program to enhance the quality of existing programs that particularly serve children from low-income families. The most common funding sources were state and local education agencies, state child-care funds, and Head Start, which were received by 56 percent, 38 percent, and 36 percent of ERF preschools, respectively. Just over half of ERF preschools received funding from only one of these sources, while over 40 percent received funding from two or more sources. The schedule on which ERF preschools operate and the characteristics of their teachers provide useful context for examining study findings. Three-quarters are full-day programs (operating for an average of 8 hours per day), 62 percent have a class size of 20 children or fewer, and almost 70 percent have a staff-to-child ratio of 1:10 or better. Seventy-five percent of the ERF teachers have bachelor's degrees, 67 percent have teaching certificates or licenses. Among teachers in ERF classrooms, 87 percent had completed college-level courses in early-childhood education or development, 67 percent had completed courses in teaching reading to elementary-school children, and 79 percent had completed courses in teaching language and literacy skills to children in a preschool setting.

**ERF funding in the preschools.** Based on the reported number of preschool children expected to be served by the FY 2003 grantees, the median ERF allocation across the 28 grantees evaluated in the FY 2003 cohort was $3,549 per preschool child per year.[4] These funds are in addition to the other government funding sources received by the preschools. To provide perspective, annual average Head Start funding per child in Fiscal Year 2003 was $7,092.[5]

**Professional development through ERF.** ERF teachers reported receiving an average of 72 hours of professional development during the previous year—the equivalent of 9 days. One hundred percent of teachers in ERF-funded classrooms reported receiving professional development in phonemic and phonological awareness (see Table 3). The vast majority of ERF teachers received training in six other language-development and early literacy topics, including literacy-rich print environments (97.8 percent), concepts of print writing and prewriting (96.7 percent), oral language (96.7 percent), facilitating emergent literacy (95.7 percent), alphabetic knowledge (92.4 percent), and oral comprehension and cognition (88.0 percent). Nine out of 10 ERF teachers reported receiving training in child assessment. Three-fourths of ERF teachers reported receiving training in traditional early-childhood topics, including children's development and ways to manage children's behavior in the classroom.

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[4] The methodology used to compute the ERF allocation per child is described in Appendix B, "Data Collection Methods."

[5] U.S. Department of Health and Human Services (April 2004), *Head Start Program Fact Sheet Fiscal Year 2003,* Administration for Children and Families. http://www.acf.hhs.gov/programs/hsb/research/2004.htm.

Table 3. Topics in which ERF teachers received professional development in the past 12 months

| Topic Areas | % ERF teachers who received training in topic |
|---|---|
| Language Development and Early Literacy | |
|     Phonemic & phonological awareness | 100.0 |
|     Literacy-rich environments | 97.8 |
|     Concepts of print writing & prewriting | 96.7 |
|     Oral language | 96.7 |
|     Facilitating emergent literacy | 95.7 |
|     Alphabetic knowledge | 92.4 |
|     Oral comprehension & cognition | 88.0 |
| Child Assessment | |
| Child Development and Behavior | 90.2 |
|     Early childhood growth & development | 76.1 |
|     Classroom management | 76.1 |
| Other Topics | 56.5 |

| Number of Topics | % ERF teachers who received training in number of topics |
|---|---|
| 0 | 0.0 |
| 1 to 4 | 1.1 |
| 5 to 8 | 21.7 |
| 9 or 10 | 77.2 |
| Mean # of topics (SD) | 9.6 (1.7) |
| Sample Size | 92 |

SOURCE: Spring teacher surveys.

**Curriculum and assessment.** The statute requires ERF grantees to identify and provide activities and instructional materials that are designed according to scientifically based reading research for developing children's oral language, phonological awareness, print awareness, and alphabet knowledge.[6] ERF programs are also expected to integrate assessments of child progress with teaching so that instruction can build on what children already know and bring them to the next level (U.S. Department of Education 2003).

In ERF preschool classrooms, 39 percent of the teachers reported following one curriculum, and 61 percent reported using a combination of curricula. The most commonly reported curricula in ERF classrooms are Creative Curriculum (reported by 46 percent of teachers) and High/Scope (Educating Young Children) curriculum (reported by 24 percent of teachers).

Nearly all ERF teachers (98 percent) reported using at least one assessment tool for children in their classes. A majority of ERF teachers (64 percent) reported using more than one assessment instrument with children in their classes.

**Classroom environments and teacher practices.** The Early Childhood Environment Rating Scale-Revised (ECERS-R) provided a measure of the general quality of the preschool

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[6] U.S. Department of Education. *Guidance for the Early Reading First Program*. Washington, DC, March 2003, p. 5.

environment. The quality of teacher-child interactions refers to the teacher's responsiveness to children; sensitivity to children's needs; consistent, positive guidance; and encouragement. As one measure of teacher-child interactions, we used the Teaching and Interactions subscale of the ECERS-R (Clifford et al. 2005). The average score on the ECERS-R Teaching and Interactions subscale in the spring was 5.8 for ERF classrooms (slightly higher than 5.7 average score in the fall), with all but 5 classrooms scoring at least a "good" or 5 on the subscale (see Figure 1).[7]

**Figure 1. Number of ERF classrooms by ECERS-R Teaching and Interactions Subscale, spring 2005**
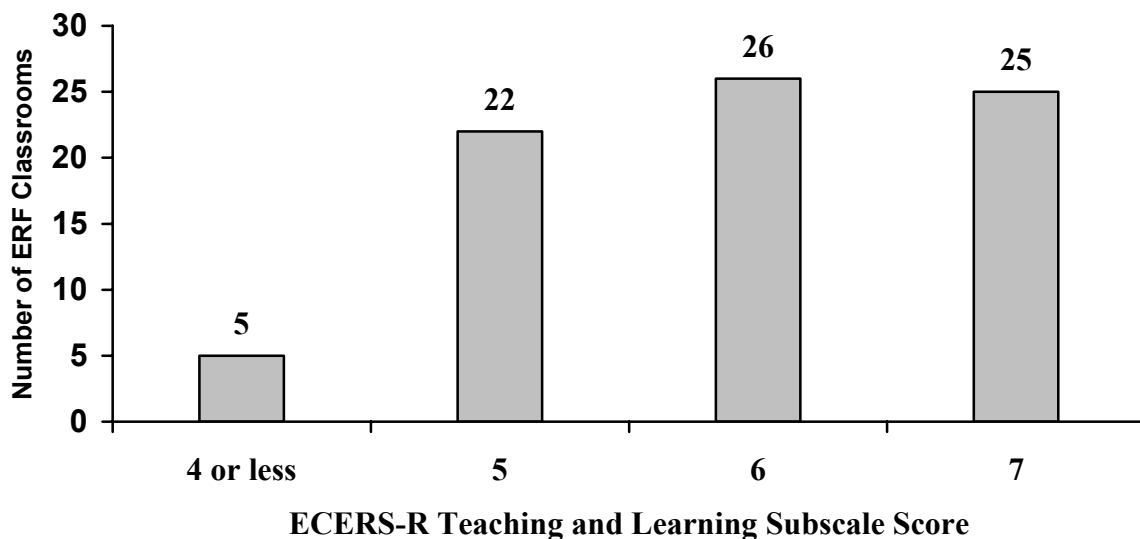


The TBRS measures the general quality of preschool classrooms (including teacher sensitivity) as well the language and early literacy aspects of teacher instructional practices and the available classroom materials. The TBRS items are scaled so that higher values represent greater frequency or quality or both, using Likert ratings that range from 1 (low or none) to 4 (high frequency/high quality) for virtually all of the items. Because of a high correlation between quantity and quality item scores, we have averaged them to create a single-item score and created subscales from these composite items.[8]

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[7] Scores on the Teaching and Interactions subscale tend to be higher than scores on the full ECERS-R scale. In a sample of Head Start classrooms, the ECERS-R score was 4.9, and the Teaching and Interactions subscale score was 5.5.

[8] Appendix C contains additional information about the TBRS subscales used in the ERF evaluation.

The total TBRS score summarizes all of the TBRS general quality and language, literacy, and assessment subscales. The subscales measured

- oral-language use
- book-reading practices
- phonological-awareness activity
- print and letter knowledge
- written expression
- portfolios
- dynamic assessment

The average TBRS total score was 2.7 for ERF classrooms in the fall and 2.6 in the spring.

## ERF Impacts on Teachers and Classroom Practices

In assessing the impact of ERF on teachers and classroom practices, we examined the following outcomes:

- teacher knowledge and skills
- the general quality of the preschool environment
- the quality of language, early literacy, and child-assessment practices and environments

Within each of these outcome areas, we examined measures for several domains. We also examined impacts on selected subgroups of teachers and classrooms.

**Teacher knowledge and skills.** We expected that ERF preschools would enhance teachers' knowledge and skills through professional development. Overall, we find that ERF had positive impacts on the hours of teachers' professional development during the 12 months preceding the spring 2005 survey and that it increased the proportion of teachers receiving professional development through mentoring.

- ERF increased the number of hours of professional development that focused on language and early literacy topics by 48 hours (6 days) over the 12 months preceding the survey.

- A higher proportion of ERF teachers than teachers in unfunded programs reported receiving professional development on language or literacy topics and on curriculum topics through mentoring or tutoring. The program's impact on the proportion of teachers receiving mentoring or tutoring on language and literacy topics was 41 percentage points.

- A larger proportion of ERF teachers than teachers in unfunded programs reported receiving workshop training on language and literacy topics. The program's impact on the proportion of teachers receiving workshop training on language and literacy topics was 41 percentage points.

ERF did not induce centers to raise the wages of their teachers who had received additional professional development through the program.

**General quality of the preschool environment.** This study examines teacher behaviors and environmental factors that relate to the general quality of the preschool classroom environment. We selected general quality measures, including teacher behaviors and classroom environment, that previous research has found to be positively correlated with young children's cognitive skills and emotional development (Vandell and Wolfe 2000; NICHD Early Childhood Research Network 2002, 2003, and 2006). However, given its correlational nature, this research is not conclusive. Further, the study examines the measures of teacher instructional practices and classroom environment that are closely related to ERF's emphasis on language and emerging literacy skills.

In the spring, ERF had *pervasive* impacts on the general quality of the preschool classroom—the classroom language environment, materials, and teaching practices that support early literacy, and child-assessment practices. In particular, ERF

- Increased the lead teachers' sensitivity and the quality of interactions toward children by approximately one standard deviation relative to what we would have expected in the absence of the program.

- Improved the quality of the assistant teachers' interactions with children by 0.79 standard deviations.

- Had positive impacts on measures of the organization of the classroom environment; effect sizes exceed one standard deviation.

- Significantly improved lesson planning.

- Increased the overall quality of the classroom-learning environment, measured by the total TBRS score (the average across subscales measuring general classroom quality and the language and early literacy environment).

- Increased the general quality of teacher-child interactions as measured by the ECERS-R teaching and learning subscale.

**Quality of language, early literacy, and child-assessment practices and environments.** In the spring, ERF had impacts on all domains of classroom language, early literacy, and assessment practices. Specifically

- Oral language use by both the lead and assistant teachers

- Book-reading practices that include introducing new vocabulary, using expressive voice, and asking open-ended questions during the book-reading session

- Phonological awareness activities that promote knowledge of letter and word sounds

- Print and letter knowledge materials and activities to promote letter recognition and the association between sounds and letters

- Written expression and early writing activities

- Child screening and progress assessments on a regular basis to plan instruction

## ERF Impacts on Children's Language and Literacy Skills and Social-Emotional Outcomes

Ultimately, through its effects on classroom practices, the ERF Program is intended to provide young children with the necessary language, cognitive and early-reading skills to prevent reading difficulties and ensure school success as they enter kindergarten. We obtained the outcome measures for the child analyses from assessments that were given to children in spring of the school year on their literacy and language skills and behavior. The assessments measured *print and letter knowledge, phonological awareness, and oral language.* We also estimated ERF's impacts on children's social-emotional development.

**Impact findings.** Overall, we find that ERF had a statistically significant positive effect on children's print and letter knowledge but no statistically discernable impact on phonological awareness or oral language. We find no evidence of negative impacts on children's social-emotional skills. Specifically:

- ERF increased children's standard scores on Pre-CTOPPP print awareness by 5.78 points relative to what we would have expected in the absence of the program. This increase indicates that ERF improved children's ability to recognize letters of the alphabet and associate letters with their sounds. The impact estimate translates into an effect size of 0.34 standard deviations. Comparison of the regression-adjusted standard scores for children in the unfunded sites to the national norms for this subtest indicates that in the absence of ERF, children in the ERF sites would have scored about 3 percentage points below the national average of 100; with exposure to ERF, their average score of 102.69 was slightly above the national average for this subtest.

- We find no evidence that ERF improved children's phonological awareness.

- We find no evidence that ERF improved children's oral language skills.

- ERF did not affect children's social-emotional skills, as measured by the SCBE-30 anger-aggression, social-competence, and anxiety-withdrawal scales. The lack of program effects in this domain is noteworthy in light of concerns that ERF might *adversely* impact these skills by compelling teachers to focus on improving language and literacy at the expense of developing other skills.

## Analysis of Mediators of ERF's Impacts on Classroom Instructional Practice and Children's Language and Literacy Skills

As a final part of the analysis of ERF, we explored potential channels, or mediators, through which ERF generated its positive impacts on classroom and child outcomes. Unlike the impact analyses, this analysis is correlational, rather than quasi-experimental, because we could not use the regression-discontinuity design to identify the causal effects of particular mediators.

Consequently, any observed effect of mediators on child or classroom outcomes might be due to the effects of unobserved factors that happen to be correlated with these mediators, rather than to the mediators themselves.

For our analysis of the channels through which ERF generated positive impacts on classroom and child outcomes, we hypothesized that the additional hours of professional development attributable to ERF and the increased proportion of teachers receiving professional development through intensive, individualized mentoring account for at least some of ERF's impact on the classroom language and early literacy environment. The impacts on classroom environments, in turn, might account for at least some of the program's impacts on children's language and literacy skills.

To investigate this hypothesis, we first examined the extent to which hours of professional development and the use of mentoring as a mode of training were associated with the classroom outcomes affected by ERF. We then examined the associations between classroom outcomes and the child outcome on which ERF had a positive impact—print and letter knowledge. Thus, our model of print awareness includes as mediators the number of phonological awareness activities, print- and letter-knowledge learning opportunities, written-expression learning opportunities, the classroom print environment, opportunities and materials for writing, book-reading practices, child portfolios, and teacher sensitivity.

The estimated marginal effect of hours of professional development is generally small and not statistically significant on each of the 10 measures with the exceptions of classroom print environment and teacher sensitivity; we estimated positive and statistically significant effects of professional development on those two measures. Similarly, the estimated marginal effect of mentoring on each of the 10 outcomes is generally small and not statistically significant, with the exceptions of child portfolios and teacher sensitivity; the estimated marginal effects of mentoring are negative and statistically significant on those two outcomes. The mediators are jointly statistically significant only for child portfolios and teacher sensitivity.

The estimated marginal effects on print and letter knowledge are not statistically significant for any of the potential mediators except print and letter-knowledge learning opportunities, which account for 27 percent of the total implied impact on print-awareness scores. Together, all eight mediators account for 60 percent of the total implied impact on print and letter knowledge and are jointly statistically significant at the 5-percent level.

# Chapter 1. Introduction and Study Background

The No Child Left Behind (NCLB) Act of 2001 created the Early Reading First (ERF) program to enhance teacher practices, instructional content, and classroom environments in preschools and help ensure that young children start school with the skills needed for academic success. This discretionary grant program provides funding to preschools that particularly serve children from low-income families so that the preschools can support age-appropriate development of children's language and literacy skills. The program, which was authorized under Title I, Part B, Subpart 2 of the Elementary and Secondary Education Act (ESEA) as reauthorized by NCLB, reflects the research of the last several years about the kinds of skills that young children must have to become successful readers. These skills include oral language (expressive and receptive language and vocabulary development), phonological awareness (rhyming, blending, segmenting), awareness of print conventions, and alphabet knowledge (letter recognition) (Whitehurst and Lonigan 2001; Pullen and Justice 2003).

The NCLB Act also mandated an independent national evaluation of the ERF program and required a final report to Congress. This final report presents the impacts of the program on the language and literacy skills of children and on the instructional content in preschool classrooms.

## Rationale and Goals of ERF

*Preventing Reading Difficulties in Young Children* (National Research Council 1998) shows that a high percentage of children from low-income families attend preschools that may successfully address other developmental domains but often fail to provide the language, cognitive, and early-reading instruction and activities necessary to develop skills to become successful readers. Improving the instructional program to support the age-appropriate development of these skills is the central focus of ERF.

ERF provides grants to school districts, other public, nonprofit, and private organizations, and collaborations of the same entities that serve 3- to 5-year-olds, especially those from low-income families. The grants must be used to provide services that will better prepare children to enter kindergarten with the necessary language, cognitive, and literacy skills that can avert reading difficulties.

ERF grants are intended to support the following items:

- A high-quality oral language and print-rich classroom environment

- Activities and instructional materials developed according to scientifically based reading research that will help develop children's oral language, phonological awareness, print awareness, and alphabet knowledge

- Screening and assessments to monitor children's acquisition of skills and to guide instruction

- Professional development developed according to scientifically based reading research that will help teachers to enhance children's language, cognitive, and early literacy skills

- Integration of the instructional materials, activities, tools, and measures into the grantee's existing programs

Grantees were also encouraged to use funds to support parent engagement and to promote continuity in the transition to kindergarten and elementary school. Two key elements of ERF are the use of scientifically based methods and the goal of enhanced professional development.

## Focus on Scientifically Based Methods

The statute  (sections 1221(b)(2) and 1208(6), ESEA) defines scientifically based reading research as that which applies rigorous, systematic, and objective procedures to obtain valid and reliable knowledge relevant to reading development, reading instruction, and reading difficulties. Specifically, this research:

- Employs systematic, empirical methods that draw on observation or experiment

- Involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn

- Relies on measurements or observational methods that provide valid data across evaluators and observers and across multiple measurements and observations

- Has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review

Using scientifically based reading research, as defined by the statute, to develop curricula and design instruction intended to enhance the oral language, phonological awareness, print awareness, and alphabetic knowledge skills of preschool-age children—particularly those from low-income families—through planned interventions is a relatively new phenomenon. Although research has identified skills that children need in order to become proficient readers, research regarding how to refine and design instructional approaches and activities that will improve the reading outcomes of children is ongoing (Whitehurst and Lonigan 2001; Pullen and Justice 2003). The national evaluation of ERF is intended to

- investigate the effects on children's language development and emergent literacy when preschools and teachers are encouraged to adopt scientifically based methods and materials

- provide evidence of the effects on preschools and teachers of focused professional development that supports the use of these materials and methods

## Focus on Professional Development

Professional development and training of teachers is envisioned as a key vehicle for implementing the desired objectives of ERF. The statute requires that the professional development be grounded in scientifically based reading research and knowledge of early language and literacy development. Consistent with the statutory definition of "professional development," ERF professional development was expected to be continuous, intensive, and classroom focused. Professional development that included mentoring and coaching was encouraged.

## Funding Levels and the Application Process

Five rounds of ERF grants have been awarded since the program began in 2002. These awards ranged from $750,000 to $4.5 million per site for a 3-year period. From FY 2002 through FY 2006, the average ERF award increased from $2.5 million to $3 million. The national evaluation of ERF focused on the second cohort of grantees from FY 2003. For the 2003 cohort, the grants totaled approximately $75 million with an average award of $2.5 million. Individual awards ranged from $1,074,846 to $4,358,750 to be spent over three years.

For FY 2003, the ERF grant competition was conducted through a 2-stage process. First, applicants were invited to submit brief pre-applications. Second, the highest quality pre-applicants were invited to submit full applications. A peer review panel of experts was convened to evaluate and score each pre-application on the basis of specific selection criteria. For FY 2003, ED received approximately 700 ERF pre-applications, and the 125 highest scoring pre-applicants were asked to submit full applications.

ED received full applications from 124 of the 125 pre-applicants that were invited to submit full applications. Each full application was required to include a brief description of the project's context, a narrative addressing the selection criteria (different than the pre-application selection criteria), a budget, and a budget narrative. A separate peer review panel of experts was convened to evaluate and score the full applications on the basis of the selection criteria.[9]

Through the use of two invitational priorities, ED expressed particular interest in (a) applicants that were partnerships between at least state education agencies or local education agencies and preschools not under administrative control of local education agencies, and (b) applicants serving significant numbers of children with special needs, including those with disabilities and limited English proficiency. Applicants that met the invitational priorities did not automatically receive extra points. However, because of ED's interest in invitational priorities, the composition of the 2003 cohorts may have differed from other cohorts. In particular, the 2003 cohort had more grantees and applicants that formed collaborations of different kinds of preschools not under the same administrative umbrella in their community (for example, collaborations of Head Start programs, preschools administered by school districts, and independent child-care centers).

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[9] The full application selection criteria included the capacity and significance of the project, the quality of project activities and services, the quality of project personnel, the quality of the management plan, and the quality of project evaluation.

In October 2003, ED made 3-year grants to the 30 highest scoring applicants. Implementation of the ERF activities was expected to begin by January 2004.

## The Evaluation

This section describes the congressional mandate and the research questions.

**Congressional Mandate**

Section 1226 of the legislation authorizing ERF (Title I, Part B, Subpart 2 of the ESEA as reauthorized by the NCLB) includes a set-aside for an independent evaluation of the effectiveness of ERF. According to the legislative requirements, the evaluation reports submitted to Congress must include information about the following items:

- Ways in which the grant recipients are improving the prereading skills of preschool children

- The effectiveness of the professional development program implemented through these grants

- How early childhood teachers are being prepared with scientifically based reading research about early-reading development

- What activities and instructional practices are most effective

- How prereading instructional materials and literacy activities based on scientifically based reading research are being integrated into preschools, child-care agencies and programs, programs carried out under the Head Start Act, and family literacy programs

- Any recommendations about strengthening or modifying this program

This national evaluation report responds to those legislative requirements.

**Research Questions**

In line with the legislative direction, the national evaluation of ERF addressed the following questions:

- What is the impact of ERF on the language and literacy skills of children enrolled in preschools that receive ERF support?

- What is the impact of ERF on the quality of language and literacy instruction, practice, and materials that preschools provide?

- To what extent are variations in ERF program quality and implementation associated with differences in the language and literacy skills of the children served?

The conceptual model that informs the research design for this evaluation is depicted in Figure 1.1. The ERF intervention is expected to directly influence teachers' experience and qualifications through professional development and to influence the classroom environment through the materials and activities in the classroom and through teacher-child interactions. As shown in the conceptual model, the quality of teachers' instructional practice and the classroom environment are viewed as central factors in determining the impact of ERF on children's literacy and language outcomes. Another central factor is the relation between ERF participation and children's social-emotional outcomes.

The study uses a regression discontinuity (RD) design to examine the extent to which additional funds and technical assistance given to ERF grantees affected children's outcomes and instructional practice relative to instructional content and outcomes in the absence of ERF. The study assesses the impact of ERF by comparing child outcomes and instructional practice in the treatment and comparison groups drawn from the universe of applicants for the FY 2003 grant competition. The treatment group consisted of 4-year-olds attending preschool in 28 ERF grantee sites, whereas the comparison group consisted of children attending preschool in 37 sites that applied for but did not receive ERF funds.

The remainder of this report presents the findings from the descriptive and impact analyses conducted for this study.

**Figure 1.1. ERF conceptual framework**

| Teacher characteristics |
| --- |
| • Experience and training<br>• Qualifications<br>• Demographics |

| Classroom environment |
| --- |
| • Group size<br>• Child-staff ratio<br>• Schedule<br>• Materials, activities<br>• Teacher-child interactions |

| ERF program |
| --- |
| • Activities<br>• Intensity/duration<br>• Fidelity of implementation |

| Child outcomes |
| --- |
| • Oral language<br>• Phonological awareness<br>• Print awareness<br>• Alphabet knowledge<br>Socio-emotional skills |

| Child characteristics |
| --- |
| • Disabilities<br>• Language |

| Family/home environment |
| --- |
| • Family structure<br>• Parental involvement<br>• Home literacy environment<br>• Family disadvantage |

# Chapter 2. Study Design

The National Evaluation of Early Reading First (ERF) uses a regression discontinuity design to assess the impact of ERF funding and program support for preschools on the language and literacy preparedness of preschool children. This study design takes advantage of the fact that the U.S. Department of Education (ED) is required to follow a formal, structured process for selecting grantees to receive ERF funding. In its published announcement of the availability of ERF grants for FY 2003 (*Federal Register* of March 11, 2003), ED established criteria for scoring each application received. Applications were reviewed and scored according to these criteria by independent reviewers. ED then awarded ERF grants to the grant applicants with the highest application scores, progressing down the score distribution until all funding available for the fiscal year had been allocated. In this way, 30 grants were awarded to the grant applicants with scores equal to or greater than 74; applicants with scores below 74 were not awarded grants.

Impact estimates were obtained by comparing child outcomes and teacher practices in funded sites to those in unfunded sites, controlling for a smooth function of the application score. Because the application scores fully reflected the selection rule used to award ERF grants, this approach will produce unbiased estimates of the effect of ERF if we control for the correct function of application score.

This chapter provides an overview of the sample, data sources, and analytic methods that are the foundation of the findings presented in Chapters 3 through 8. A fuller description of these issues is presented in Appendix A.

## Sample Size and Sample Selection Process

The preschools that received FY 2003 ERF grants serve children as young as three years old. However, because of limited study resources, the study focuses on 4-year-old children who were attending ERF preschools in school year 2004–2005 and who were expected to enter kindergarten in the following school year.

The sample of ERF applicants for the study includes 28 of the 30 applicants who received an ERF grant and 37 of the 67 unfunded applicants with the highest application scores who agreed to participate in the study.

Approximately three classrooms were randomly selected from each participating site (see Table 2.1). The study team randomly selected approximately 11 4-year-old students per classroom whose parents had provided written consent for participation in the study. This section describes the final sample of sites, preschool teachers surveyed, classrooms observed, and students assessed.

Table 2.1 Sample Sizes for National Evaluation of ERF

| Unit of Analysis | Funded sample size | Unfunded sample size | Total |
|---|---|---|---|
| ERF grantees/unfunded applicants | 28 | 37 | 65 |
| Preschools | 86 | 75 | 161 |
| Classrooms observed | 78 | 91 | 169 |
| Teachers surveyed | 92 | 102 | 205 |
| Children assessed | 803 | 855 | 1,658 |

The site-selection process began with the 124 sites that submitted full applications to the 2003 grant competition. Figure 2.1 graphically displays the site-level sampling process. The treatment group consists of 28 of the 30 sites that were awarded ERF grants in October 2003. Two successful applicants were excluded from the study because they voluntarily left the program and were no longer ERF sites by spring 2005. All of the remaining 28 grantees agreed to participate in the study.

The comparison group sample began with the 94 sites that applied for but did not receive an ERF grant. Thirty-two unfunded sites were eliminated and not asked to participate for several reasons. Since the regression-discontinuity design makes use of comparison sites with scores close to those of the funded sites, the lowest-scoring 23 applicants—those that scored below 42.4—were not contacted during the recruiting process. Five additional unfunded sites and their associated 25 preschools were removed from the sample because they received a grant in a subsequent round of ERF funding.[10] In addition, three unfunded sites were excluded because they did not meet the criteria for participation in the study.[11] Of the 63 remaining unfunded sites that were contacted for inclusion in the study, 37 sites (59 percent) participated. (see Appendix B for additional information about the site and preschool selection and recruiting process.)

Once we arrived at the final sample of 28 funded sites and 37 unfunded sites, we continued the selection and recruitment process with preschools in those sites. Applicants typically consisted of collaborations of 5–7 preschools. We eliminated 32 preschools in these sites from the sample: 25 unfunded preschools because they were funded by ERF in the 2004 competition and 8 unfunded preschools that served children in special circumstances—for instance, migrant children only (see Figure 2.2).

Once we arrived at the sample of 157 funded and 246 unfunded preschools eligible for the study, the recruiting process continued. Because ED encouraged collaborations of diverse types of preschools to apply for 2003 ERF grants (for example, school-district-administered preschools, Head Start centers, and independent child-care centers), in many unfunded sites the original applying agency did not exercise management control of some of preschools that had been part

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[10]Some ERF applicants listed different preschools in their 2003 and 2004 applications. The five unfunded sites that were removed because they were awarded 2004 ERF grants had substantial overlap between the preschools in their successful 2004 applications and the preschools in their unfunded 2003 application. Another four unfunded sites that later received grants in 2004 were included in our sample of sites because there was little to no overlap between the preschools listed in their 2003 and 2004 applications.

[11] Of the three unfunded sites that were excluded because they did not meet the criteria for participation in the study (one served only deaf children; one proposed to provide only wraparound care consisting mainly of lunch and nap; and one proposed to select preschools only after the ERF grant was awarded).

of the 2003 grant application. Thus, eligible preschools in unfunded sites were recruited individually. Only 121 (49 percent) of eligible unfunded preschools agreed to participate in the study. In the funded sites, the process of recruiting preschools was less challenging because the fiscal agent for the grant exercised some administrative control over the preschools. Only one of the 157 eligible funded preschool refused to participate.

After the sites and preschools in the study were recruited, approximately three classrooms were selected across all the participating preschools in each site with probabilities proportional to the number of 4-year-old children in each class.[12] From the preschools that agreed to participate, a total of 229 classrooms were randomly selected—103 ERF classrooms and 126 non-ERF classrooms (379 ERF classrooms and 186 unfunded classrooms were randomly excluded from the sample).

The study team randomly selected approximately 11 4-year-old students per classroom whose parents had provided written consent for participation in the study. Of the 1,914 selected 4-year old children, 803 ERF children and 855 non-ERF children were assessed in spring 2006 and included in the final analysis sample, which represents a response rate of 87 percent.

Surveys were sent to lead teachers in the ERF classrooms and non-ERF classrooms selected for the study and 92 ERF teachers and 102 non-ERF teachers completed the survey.[13]

In sites where child and teacher data was collected from 4 or 5 classrooms, 3 of those classrooms were randomly selected for the classroom observations; 78 ERF classrooms and 91 non-ERF classrooms were observed.

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[12] The number of classrooms selected depended on the enrollment in each class and the number of participating classes. If a sample of 33 children could not be attained with 3 classrooms, then additional randomly selected classrooms were added. If only 1–2 eligible classrooms existed in a particular site, then only 1–2 classrooms were selected for the study.

[13] Because some teachers taught two classes (e.g., a morning or afternoon session), they were asked to complete a survey referencing only one of their randomly selected classes. For that reason, teacher surveys were sought from 98 teachers in funded classes and 114 teachers in non-funded classes.

**Figure 2.1. Flow of applicants from 2003 ERF grant competition into treatment and comparison sites selected for study sample**



Pre-applications for 2003 ERF Grants
(n = approximately 700 sites)

Not invited by ED to submit full ERF application (approximately 575 sites)

Invited by ED to submit full application (n = 125 sites)

Did not submit full ERF application (n = 1 site)

Submitted full ERF application
(n = 124 sites)

Awarded ERF grant
(n = 30 sites)

Did not receive 2003 ERF grant (n = 94 sites)

Eligible for treatment group
(n = 28 funded sites)

Not eligible for treatment group because no longer ERF grantee by spring 2005
(n = 2 sites)

Eligible for comparison group
(n = 63 unfunded sites)

Not eligible for comparison group
(n = 31 sites)
- Application score below 42.4 points (n = 23 sites)
- Awarded 2004 ERF grant (n = 5 sites)
- Preschools did not meet criteria for study participation (n = 3 sites)

**Final sample of treatment group sites agreeing to participate
(n = 28 funded sites)**

Site refused to participate
(n = 26 unfunded sites)

**Final sample of comparison group sites agreeing to participate
(n = 37 unfunded sites)**

**Figure 2.2. Flow of sites selected for study sample into analysis sample of children assessed, teachers surveyed, and classrooms observed**

Final sample of sites agreeing to participate (n = 28 funded sites and 37 unfunded sites)

Preschools not eligible for study: (n = 33 unfunded preschools)
- Received 2004 ERF grant (n = 25 unfunded preschools)
- Served primarily children in special circumstances (n = 8)

Preschools eligible for study (n = 157 funded preschools, 246 unfunded preschools)

Preschools agreeing to participate (n = 156 funded preschools, 121 unfunded)

Preschools refusing to participate (n = 1 funded preschool, 125 unfunded preschools)

Classrooms randomly excluded from analysis sample (n = 379 funded classrooms; 186 unfunded classrooms)

Random selection of classrooms for child assessments and teacher surveys

Classrooms selected for child assessments (n = 103 classrooms in 86 funded preschools; n = 126 classrooms in 75 unfunded preschools)

**Analysis sample of teacher surveys (n = 92 ERF teachers and 102 non-ERF teachers)**

Excluded because of nonresponse or dual classes (n = 11, 24)

**Analysis sample of child assessments (n = 803 ERF children, 855 non-ERF children)**
Children excluded:
- No parental consent (n = 99, 86)
- Not age eligible (n = 140, 415)
- Not randomly selected for analysis sample (n = 280, 150)
- Not assessed (n = 132, 124)

Analysis sample of classroom observations (n = 78 ERF classrooms and 91 non-ERF classrooms)

Classrooms not randomly selected for observations (n = 25, 35)

## Data

Child outcomes are the primary focus of this evaluation. The study also measured ERF's impacts on key dimensions of teacher qualifications, classroom environment, and classroom practice that ERF sought to affect and that were, in turn, expected to affect children's language and literacy skills (see Figure 1.1 in Chapter 1).

The study team collected data for the evaluation from several sources. Trained staff directly assessed the language and literacy skills of children participating in the study. Trained observers measured classroom practice in a subsample of study classrooms. The teachers of all children in the sample and the director or principal of each preschool participating in the study completed a self-administered questionnaire. Teachers of the sampled children were also asked to rate each child's social-emotional development. The study team also obtained data from the preschools about children's school attendance for the 2004–2005 year. Finally, parents of the sampled children were interviewed by telephone.

Data were collected at two times: fall 2004 and spring 2005. The same data-collection instruments and procedures were used in the funded and unfunded sites.

**Child Assessments**. Table 2.2 shows the instruments that were used to measure children's language and literacy skills and social-emotional development and gives key data available on the psychometric properties of the instruments.[14] ERF was designed to affect the specific domains of emergent literacy—print and letter knowledge, phonological awareness, and oral language. *Print and letter knowledge* was measured by using the Print Awareness subtest of the Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP, Lonigan et al. 2002). *Phonological awareness* was measured by using the Elision subtest of the Pre-CTOPPP (Lonigan et al. 2002). *Oral language* was measured by using two separate assessments: the Expressive One-Word Picture Vocabulary Test (EOWPVT, Brownell 2000) and the Auditory Comprehension subtest of the Preschool Language Scale, Fourth Edition (PLS-4, Zimmerman et al. 2002). Higher values for each measure are associated with higher literacy and language skills. All children were assessed in English in the spring. In the fall, Spanish-speaking children who did not pass the English proficiency screener, pre-LAS, were assessed in Spanish.

There were some concerns that an increased focus on literacy activities in preschools might lead teachers to focus less attention on social and emotional development; therefore, teachers were asked to complete a 30-item evaluation of *social-emotional development* for each child—the Social Competence and Behavior Evaluation: SCBE-30 (LaFreniere and Dumas 1996). This social-emotional evaluation was designed to provide measures of children's social competence, anger-aggression, and anxiety-withdrawal.

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[14] Greater detail regarding the psychometrics of the child assessment and classroom observation instruments is provided in Appendix C.

Table 2.2. Data-collection instruments: child assessments

| Instrument name | Domain measured | Psychometric information from published sources |
|---|---|---|
| (Pre-LAS)[1] | English proficiency screening | Internal consistency reliability = .86–.90 |
| Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP)[2] | Print and letter knowledge | Test of Preschool Early Literacy (TOPEL):<br>• Internal consistency reliability = .95<br>• Test-retest reliability = .89 |
| | Elision[3] | Internal consistency reliability = .71-.88. |
| Expressive One-Word Picture Vocabulary Test (EOWPVT)[4] | Expressive vocabulary | • Internal consistency reliability coefficients = .96–.98<br>• Test-retest reliability = .95 |
| Preschool Language Scale (PLS-4)[5] | Auditory comprehension | • Test-retest reliability = .83–.91<br>• Internal consistency reliability coefficients = .83–.90 |
| Social Competence & Behavior Evaluation (30-item)—Teacher Rating[6] | • Social competence<br>• Anger-aggression<br>• Anxiety-withdrawal | Internal consistency reliability coefficients = .85–.92 |

[1] Duncan, S.E., and DeAvila, E.A. (1998). *Pre-LAS 2000*. Monterey, CA: CTB/McGraw-Hill.
[2] Lonigan, C., Wagner, R., Torgesen, J., and Rashotte, C. (2007). *The Test of Preschool Early Literacy (TOPEL)*. Austin, TX: PRO-ED.
[3] Internal-consistency reliability coefficients of Elision subtest from unpublished tabulations using data from the Head Start Impact Study (U.S. Department of Health and Human Services 2005) and the forthcoming Even Start Classroom Observations and Interventions and Preschool Curriculum Evaluation Research studies, both being conducted by IES.
[4] Brownell, R. (2000). *Expressive One-Word Picture Vocabulary Test Manual*. Novato, CA: Academic Therapy Publications.
[5] Zimmerman, I. L., Steiner, V.G., and Pond, R.E. (2002). *Preschool Language Scale-4th Edition, Examiner's Manual*. San Antonio, TX: The Psychological Corporation.
[6] La Freniere, P. J., and Dumas, J. E. (1996). "Social competence and behavior evaluation in children ages 3 to 6 years: The short form (SCBE-30)," *Psychological Assessment, 8,* 369–377.

**Classroom Observations**. Through direct observations of the preschool classrooms of the assessed children, the ERF evaluation team sought to measure the degree to which ERF grant support changed instructional practice and overall quality of the preschool classrooms. Table 2.3 shows the dimensions of classroom practice and quality measured by the two instruments used for observation—the Teacher Behavior Rating Scale (TBRS)[15] and 11 items from the Early Childhood Environment Rating Scale-Revised (ECERS-R) that form the Teaching and Interactions Subscale.[16] Trained members of the study team conducted the classroom observations.

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[15] Landry et al. (2004). "Teacher Behavior Rating Scale (TBRS)," unpublished research instrument.
[16] Harms, T., Clifford, R.M., and Cryer, D. (1998). *Early Childhood Environment Rating Scale: Revised Edition*. NY: Teachers College Press.

Table 2.3. Data-collection instruments: observations

| Classroom Observation Instrument name | Primary dimensions, subscales tapped | Psychometric tnformation from ERF sample |
|---|---|---|
| Teacher Behavior Rating Scale | Language and Literacy Environment and General Preschool Quality<br>• Book-reading practices<br>• Oral language use by lead teacher<br>• Phonological awareness activities<br>• Print and letter knowledge<br>• Written expression<br>• Child portfolios<br>• Dynamic assessment<br>• General teaching behaviors<br>• Classroom community<br>• Teacher sensitivity<br>• Lesson planning<br>• Quality and organization of activity centers<br>• Quality of team teaching<br>• Math concepts | Internal consistency for subscales = .66–.94<br>Interrater reliability = .75–1.0 |
| ECERS-R Teaching and Interactions (11 items) | Preschool quality with emphasis on use of language and communication<br>• Interactions among children<br>• Encouraging children to communicate<br>• Discipline<br>• Supervised free play<br>• General supervision of children<br>• Greeting/departing<br>• Group time<br>• Informal use of language<br>• Supervision of gross motor<br>• Reasoning skills<br>• Staff-child interactions | Internal consistency = .85<br>Interrater reliability = .87–.92 |

**Other Data Sources.** The evaluation team also developed self-administered surveys that the teachers and preschool principals or directors completed in the fall of 2004 and spring 2005. Parents of children in the study were interviewed through computer-assisted telephone interviewing (CATI) technology. The major constructs measured by each of these surveys are shown in Table 2.4. The team also conducted in-depth telephone interviews with grantee directors for each of the 28 funded grantees in the sample to learn about their use of ERF funds, and to obtain background information about the context in which ERF grants were implemented. (Appendix B provides additional information on data-collection procedures.)

Table 2.4. Data-collection instruments: surveys and in-depth interviews

| Target respondent | Primary dimension(s) tapped |
|---|---|
| Teachers | <ul><li>Demographics</li><li>Background</li><li>Education</li><li>Experience</li><li>Classroom characteristics</li><li>Curricula used & trained on</li><li>Assessments used</li><li>Professional development methods, hours, and topics</li></ul> |
| Center directors | <ul><li>Demographics</li><li>Background</li><li>Education</li><li>Experience</li><li>Classroom characteristics</li><li>Curricula used & trained on</li><li>Assessments used</li><li>Professional development methods, hours, and topics</li><li>Funding sources</li></ul> |
| Parents | <ul><li>Demographics</li><li>Child preschool experience</li><li>Literacy resources available</li><li>Weekly non-school literacy activities</li></ul> |

## Analytic Methods for the Impact Analysis

The impact analysis uses a regression discontinuity design to address the following research questions:

- What are the impacts of ERF on children's language and literacy and social-emotional indicators?

- What are the impacts of ERF on the quality of language and literacy instruction, practice, and materials?

- Do ERF impacts vary across subgroups defined by key child, teacher, or program characteristics?

The "discontinuity" in grant awards based on the application scores was used to identify ERF impacts. To estimate impacts, we used regression models to compare child and classroom outcomes in the funded sites (the treatment group) to those in the unfunded sites (the comparison group), and we controlled for a smooth function of grant application score. If one assumes that the outcome variables exhibit a stable continuous relationship with the application score and that we have correctly modeled this relationship, the sharp discontinuity in ERF grant receipt at the score cutoff, conditional on this smooth function of application score, identifies ERF's impacts.

Missing values of covariates were imputed using methods described in Appendix A. Sampling weights were used to account for the random selection of classrooms to the analysis sample, and to give equal weight to each site (see Appendix A). Appendix A discusses the statistical models used to estimate impacts, the robustness of our findings for a broad range of analytic decisions, and the statistical power for detecting impacts under the sample design.[17]

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[17] The minimum detectable impact in effect size units is 0.30 standard deviations for a typical child outcome and 0.89 standard deviations for a typical classroom outcome.

# Chapter 3. Characteristics of Participating Children and Families

The ERF program was designed to serve predominately children in low-income communities. The governing statute contains several requirements, and for FY 2003, the Department of Education (ED) had several preferences about the characteristics of children and families that should be served by the ERF program. Congress required ERF applicants to be located in school districts

- that have the highest numbers or percentages of children in kindergarten through third grade needing reading improvement
- that are generally located in low-income communities

ED also expressed an interest in receiving applications from preschools serving large numbers of children with special needs, including English language learners (ELLs), through an invitational priority in the full application, although such applications were not awarded additional points in scoring.

In this chapter, we summarize the characteristics of children and families in the 2003 cohort of ERF grantees as reported in the spring 2005 survey of parents. When data supports such a comparison, we compare the characteristics of the ERF sample with the characteristics of the general population of children nationally to assess the extent to which the congressional mandate to serve children predominately from low-income families and ED's priority to target students with limited English were achieved.

In order to provide additional context for the study findings and facilitate comparison to other studies, we discuss how children in ERF preschools compare to those in a nationally representative sample of Head Start preschools.[18] Head Start is the largest federally funded preschool program for low-income children and requires that most participants be from households with income below the federal poverty level. Because of the applicant-eligibility requirements for ERF and ED's competitive priority for preschools where at least 75 percent of children are eligible for free or reduced-price lunches (or where at least 75 percent of the children enrolled in the elementary school in the school attendance area in which that preschool is located qualify to receive free or reduced price lunches), most ERF grantees are located in school districts in which a large percentage of children are eligible for free or reduced-price school meals and which have income eligibility cutoffs of 130 percent and 185 percent of the federal poverty level, respectively.[19] Thus, the Head Start program uses a lower income threshold for allocating its services to economically disadvantaged children than ERF uses.

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[18] The Head Start Family and Child Experiences Survey (FACES) was first conducted in 1997 with a national probability sample of Head Start children. A 3-stage design was used to sample 3,648 children from 40 Head Start programs across the 50 States, Puerto Rico, and the Territories of the United States. Of those, 3,179 families (87 percent) provided signed consent forms before the fall 1997 data collection. (U.S. Department of Health and Human Services, 2002, *A Descriptive Study of Head Start Families: FACES Technical Report I,* pp. 15–19. http://www.acf.hhs.gov/programs/opre/hs/faces/reports/technical_report/technical_report.pdf)

[19] No income-eligibility requirements are imposed for participation in ERF at the preschool or child level. However, eligibility to receive ERF grants is extended to Local Education Agencies (LEAs) that are eligible to receive a subgrant under the Reading First program or to public and private organizations that are located in one of those LEAs, or to one or more LEAs in applying in collaboration with such an organization or agency. To be eligible for a Reading First state subgrant, an LEA must have large numbers or percentages of students in grades K–3 who read

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We compared the characteristics of ERF children to those in unfunded sites to provide some context for interpreting the impact findings presented later in this report. It is important to note that the ERF and non-ERF samples are not designed to be equivalent (which one would expect in a randomized design). Further, the sample of students at preschools that applied for but were not awarded ERF grants is not designed to be representative of all students at unfunded preschools. Because of the regression discontinuity design, we selected a sample of schools in the interval closest to the cutoff point for application scores that were willing to participate in the study. As a result, the funded and unfunded samples may have different characteristics; inclusion of the application score variable in the regression analysis is intended to control for these differences in estimating impacts on child outcomes.

In the following sections, we describe ERF children and families along a series of indicators—household income, national origin and languages spoken, race and ethnicity, and parental marital status—to demonstrate that the ERF program does in fact serve a disadvantaged population, with a higher proportion of Hispanic children, children of immigrants, and English-language learners (ELLs) than occurs in the national population of children in this age group.[20] We also present fall 2004 assessment scores, which show that our sample was functioning below national norms for 4-year-olds on several assessments at the outset of the study. These comparisons demonstrate how different the ERF sample is from the non-ERF sample before controlling for selected covariates, and they provide important context for interpreting the findings presented in this report.[21]

## Parent's Household Income

With 35 percent of the households of ERF participants reporting monthly income of less than $1,500 (see Table 3.1), ERF participants are more likely to be low-income than the average child in the U.S. On an annualized basis, this level of monthly income would place the annual income of a family of four at approximately the federal poverty level. Nationally, about 17 percent of children ages 3 to 5 years old live in households with monthly income of less than $1,500.[22] As might be expected, given the different income-eligibility requirement for Head Start, the sample of ERF participants does not appear to be as disadvantaged economically as the Head Start sample, in which 66 percent of parents reported household income of $1,500 or less per month.[23] No differences are apparent in the income levels between sampled households in funded and unfunded sites.

below grade level *and* must meet one of the following criteria: (1) has a significant number or percentage of schools identified for school improvement under Title I, Part A (i.e., that fail to meet Annual Yearly Progress goals for two consecutive years), (2) include an empowerment zone or enterprise community as defined by the IRS, or (3) have the highest numbers or percentages of children counted for the purposes of Title I grants to LEAs in comparison to other school districts in the state. In practice, the percentage of students counted under Title I for that purpose is based on the percentage of those who are approved as eligible for free or reduced-price meals.

[20] The data reported for ERF participants are derived from self-reports by parents and are not independently verified. Also, because the survey response rate for parents was about 61 percent, some unmeasured nonresponse bias may exist and should be considered in interpreting these findings.

[21] Our sample selection process eliminated preschools or preschool classrooms that had large percentages of children with learning disabilities because of concerns about conducting assessments with those children. Hence, we are unable to conduct analyses of the extent to which the ERF program served children with learning disabilities.

[22] Calculations from Current Population Survey (U.S. Census Bureau, 2005).

[23] U.S. Department of Health and Human Services (January 2002) *A Descriptive Study of Head Start Families: FACES Technical Report I,* p. 47.

Table 3.1. Parental household income, by ERF funding status

| | Overall | ERF participants | Children in non-ERF preschools | P-value | Head Start participants |
|---|---|---|---|---|---|
| Percent of participants with monthly household income: | | | | .847[1] | |
| $500 or less | 5.6 | 5.1 | 6.0 | | 11.8 |
| $501 to $999 | 13.6 | 12.5 | 14.6 | | 29.6 |
| $1,000 to $1,499 | 16.7 | 17.1 | 16.3 | | 24.8 |
| $1,500 to $1,999 | 19.0 | 20.1 | 18.1 | | 14.4 |
| $2,000 or more | 36.3 | 36.3 | 36.3 | | 15.7 |
| % refused | 8.8 | 9.0 | 8.7 | | unknown |
| Sample Size | 1,146 | 545 | 601 | | 2,983 |

[1] P-value is based on chi-squared test of association.
SOURCE: Spring survey of parents and Head Start FACES technical report (U.S. Department of Health and Human Services, 2002).

## National Origin and Language of ERF Families

Table 3.2 shows that the parents of 39 percent of children served by ERF preschools were born in a country other than the United States. Nationally, about 23 percent of 3- to 5-year-olds in 2005 lived in households in which a parent was born in a foreign country.[24] Further, about half (51 percent) of the parents of ERF participants indicated that a language other than English was spoken most often at home. More parents of ERF participants were born outside of the U.S. compared to the FACES Head Start sample (39 percent compared to 19 percent).[25] Similarly, a larger fraction of ERF parents than Head Start parents reported that the primary language spoken at home was other than English (41 percent as compared to 36 percent).[26] Compared to children in the unfunded sites, the sample of children from preschools awarded ERF grants had a higher proportion of children whose parents were foreign born and who lived in households in which the primary language was not English.

[24] Calculations from Current Population Survey (U.S. Census Bureau, 2005).
[25] *A Descriptive Study of Head Start Families: FACES Technical Report I*, January 2002, p. 37.
[26] Ibid., p. 60.

Table 3.2. Parent national origin and language, by ERF funding status

| | Overall | ERF participants | Children in non-ERF preschools | P-value[1] | Head Start participants |
|---|---|---|---|---|---|
| | % | % | % | | % |
| National origin of parents | | | | | |
| % U.S. born | 64.4 | 60.6 | 67.9 | .022 | 81.3 |
| % foreign born | 35.5 | 39.3 | 32.1 | | 18.7 |
| Percent parents with language other than English spoken at home | 45.5 | 50.6 | 40.8 | .001 | |
| Percent parents most frequently speaking language other than English | 37.7 | 41.4 | 34.3 | .025 | 35.7 |
| Sample Size | 1,146 | 545 | 601 | | 3,120 |

[1] P-values are based on chi-squared test of association.
SOURCE: Spring survey of parents and Head Start FACES technical report (U.S. Department of Health and Human Services, 2002).

## Race and Ethnicity

The survey results indicate that a majority of the ERF participants were children of color. Table 3.3 shows that Hispanic children composed the largest ethnic group of ERF participants (46 percent). This proportion is more than twice the national proportion of Hispanic children ages 3 to 5, which in 2005 was estimated to be 21 percent.[27] Compared to the 4-year-olds in the Head Start sample, the ERF program served more Hispanic children (46 percent versus 30 percent) and fewer African-American children (24 percent versus 26 percent) and white children (27 percent versus 31 percent).[28] Within the ERF sample, significant differences were found between the funded and unfunded sites, with ERF program sites serving more Hispanic children and fewer white children than sites that did not receive ERF funding.

[27] Current Population Survey, March 2005.
[28] *A Descriptive Study of Head Start Families: FACES Technical Report I,* p. 29.

Table 3.3. Child race and ethnicity, by ERF funding status

| | Overall | ERF participants | Children in non-ERF preschools | P-value[1] | Head Start Participants Age 4 |
|---|---|---|---|---|---|
| | % | % | % | | % |
| Race or ethnicity of child | | | | .010 | |
| % African American | 23.8 | 23.8 | 23.9 | | 26.1 |
| % Hispanic | 42.7 | 46.2 | 39.5 | | 30.0 |
| % White | 27.2 | 22.8 | 31.1 | | 31.4 |
| % Other | 6.3 | 7.2 | 5.5 | | 11.6 |
| Sample Size | 1,145 | 543 | 602 | | 1,991 |

[1] P-value based on chi-squared test of association.
SOURCE: Spring survey of parents and Head Start FACES technical report (U.S. Department of Health and Human Services, 2002).

## Parent Marital Status

The parents of almost 40 percent of the ERF participants were unmarried, including 12 percent who were separated, divorced, or widowed and 28 percent who had never been married (see Table 3.4).[29] According to the March 2005 Current Population Survey (CPS), 28 percent of households with 3- to 5-year-olds contain parents who are unmarried, including 19 percent, who had never been married. Compared to households nationally with 3- to 5-year-old children, a larger proportion of parents of ERF children are unmarried. Although the difference is not statistically significant at conventional significance levels, parents in funded sites had a somewhat lower rate of being single parents than parents in the unfunded sites. The proportion of parents who are unmarried in the ERF sample is much lower than in the sample of 4-year-olds in Head Start (58 percent).[30]

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[29] The respondent for a family was the person who signed the parent consent form in fall 2004. In the absence of that person, another adult with whom the child lived was interviewed. The birth mother was the respondent for the spring 2005 survey in 80 percent of the cases; the birth father was the respondent in 13 percent of the surveys; the child's grandmother was the respondent for 4 percent of the children.
[30] *A Descriptive Study of Head Start Families: FACES Technical Report I,* p. 37.

Table 3.4. Parent marital status, by ERF funding status

| | Overall | ERF Participants | Children in non-ERF Preschools | | Head Start Participants |
|---|---|---|---|---|---|
| | % | % | % | P-value[1] | % |
| Parent marital status | | | | .070 | |
| % married | 59.9 | 63.5 | 56.7 | | 42.1 |
| % unmarried (total) | 39.8 | 36.5 | 42.9 | | 56.8 |
| % separated/divorced/widowed | 11.7 | 11.0 | 12.3 | | 23.1 |
| % never married | 28.2 | 25.5 | 30.6 | | 33.7 |
| Sample Size | 1,146 | 545 | 601 | | 3,120 |

[1] P-value based on chi-squared test of association.
SOURCE: Spring survey of parents and Head Start FACES Technical Report, 2002.

## Child Standardized Assessment Scores

Table 3.5 shows that children in both funded and unfunded sites scored below national norms (mean score of 100) for 4-year-old children on Print Awareness, Expressive Vocabulary, and Auditory Comprehension in the fall 2004 assessments.[31] Due to the timing of these assessments, some of which did not occur until two to three months into the school year, these scores are not true baseline measures; however, they do provide some indication of the degree to which the ERF sample is disadvantaged relative to other children nationally. Fifteen percent of children in the funded sites and 8 percent of children in the unfunded sites were assessed in Spanish after failing the English language screener. Data for the Head Start sample are not included because the FACES study did not use these child assessments.

Table 3.5. Standard scores on fall 2004 assessments, by ERF funding status

| | ERF Participants | Children in non-ERF preschools | |
|---|---|---|---|
| | Mean | Mean | P-value[1] |
| Standardized Assessment Score | | | |
| Print Awareness | 93.58 | 90.83 | 0.35 |
| Expressive Vocabulary (EOWPVT) | 82.90 | 82.77 | 0.82 |
| Auditory Comprehension (PLS-IV) | 91.71 | 90.50 | 0.32 |
| Sample Size | 805 | 864 | |

[1] P-values (of adjusted difference in means), two-tailed test.
SOURCE: ERF fall child assessments.

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[31] Standardized test scores are based on a mean of 100 and a standard deviation of 15.

In summary, ERF participants appeared to be more disadvantaged than the national average. A relatively large proportion of children served by ERF grantees had some characteristics associated with disadvantage. More than one-third of the ERF sample reported monthly income of less than $1,500, compared to 17 percent of households with 3- to 5-year-olds nationally. Children in this cohort were also more likely than children nationally to come from single-parent households (40 percent compared to 28 percent), be Hispanic (46 percent compared to 21 percent), and have foreign-born parents (39 percent compared to 23 percent). About four in 10 ERF parents (41 percent) reported that the primary language spoken in the home was something other than English. Initial scores on standardized assessments suggest that children were functioning below national norms when they entered the ERF program.

While the ERF sample appeared more disadvantaged than the general population of households that had 3- to 5-year-old children, they appeared less disadvantaged economically than the sample of 4-year-olds in the FACES Study. These patterns are consistent with Head Start's participation requirements, which are more tightly focused on disadvantaged children.

Compared to the unfunded preschools in our sample, ERF preschools had more foreign-born parents (40 percent versus 32 percent), more Hispanics (46 percent versus 40 percent), and more children whose parents were married (although the latter was not statistically significant).[32] There were no differences in family income or initial standardized assessment scores between the students at funded preschools and students at unfunded preschools.

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[32] The analysis of child outcomes takes account of these differences.

# Chapter 4. Characteristics of Programs Receiving ERF Funding

The types of preschools awarded ERF funds varied widely with regard to their sources of funding, their operating schedules, and the characteristics of their teachers. These factors may affect the way that ERF is implemented and the value of the additional resources that ERF provides. In this chapter, we describe the preschools in the national evaluation's sample—both funded and unfunded—and compare them on these characteristics. The data, provided by either the preschool directors or teachers in the spring of 2005, were from preschools drawn from the FY 2003 cohort of ERF applicants.

Overall, the vast majority of ERF preschools (95 percent) combine ERF funding with other government funding sources, which is consistent with the goal of the program to enhance the quality of existing programs that serve particularly children from low-income families. The most common funding sources are state and local education agencies, state child-care funds, and Head Start, which were received by 56 percent, 38 percent, and 36 percent of ERF preschools, respectively. Just over half of ERF preschools received funding from only one of these sources, while over 40 percent received funding from two or more sources. No significant differences in the number or types of funding sources were reported by ERF and non-ERF preschools.

The schedule on which ERF preschools operate and the characteristics of their teachers provide useful context for examining study findings. Three-quarters of ERF preschools are full-day programs (operating for an average of 8 hours per day), 62 percent have a class size of 20 children or fewer, and almost 70 percent have a staff-to-child ratio of 1:10 or better. Three quarters of ERF teachers have bachelor's degrees, 67 percent have teaching certificates or licenses, and most (87 percent) had completed college courses in early-childhood education or development. Many teachers had completed at least 6 college courses in teaching reading to elementary school children (67 percent) and/or teaching language and literacy skills to children in a preschool setting (79 percent).

In the following sections, we describe the ERF programs with respect to four major dimensions: funding levels, funding sources, program operations, and teacher characteristics.

## Grantee Funding Levels—Overall and by Child

The FY 2003 ERF grants were awarded in October 2003. Sites were expected to begin implementing the program by January 2004. Total funding levels for the 3-year period ranged from a high of $4.36 million to a low of $1.07 million per site. Three-quarters (75.5 percent) of grantee directors reported that their fiscal agent, with responsibility for overseeing the financial aspects of the ERF grant, was their local education agency[33] (see Figure 4.1).

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[33] Although just over half of the grantees reported receiving funds from their state or local education agencies, three-quarters reported that their fiscal agent for the ERF grant was their local education agency.

**Figure 4.1. Fiscal Agents of ERF Grants**
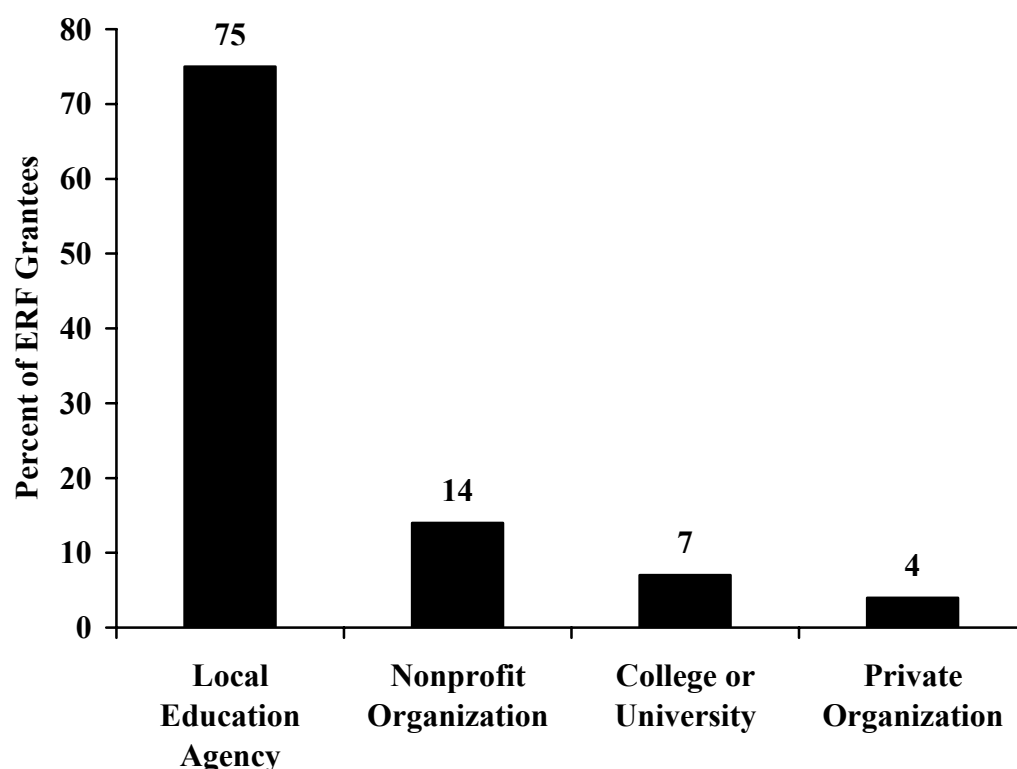


An additional 14 percent of grantee directors indicated that their fiscal agent was a nonprofit organization; 7 percent reported that a college or university fulfilled the role of fiscal agent; and the remaining 3.5 percent reported their fiscal agent to be a private organization.

Based on the reported number of preschool children expected to be served by the FY 2003 grantees, ERF grant amounts ranged from a high of $6,726 per child to a low of $402 per child per year. The median ERF allocation across the 28 grantees evaluated in the FY 2003 cohort was $3,549 per preschool child per year.[34] These funds are in addition to the other government funding sources received by the preschools. To provide perspective, annual average Head Start funding per child in Fiscal Year 2003 was $7,092.[35]

## Funding Sources

ERF is designed to enhance instructional practice and classroom environments in existing early-education programs, such as Title I preschools, state pre-kindergarten programs, Head Start centers, child-care centers (including those receiving state child-care funds), and family-literacy programs such as Even Start. The diverse government funding sources of ERF preschools reflect that goal.

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[34] The methodology used to compute the ERF allocation per child is described in Appendix B, "Data Collection Methods."

[35] U.S. Department of Health and Human Services (April 2004), *Head Start Program Fact Sheet Fiscal Year 2003,* Administration for Children and Families. http://www.acf.hhs.gov/programs/hsb/research/2004.htm.

The vast majority of ERF preschools received at least one other source of government funding; only 4.7 percent reported no other government funding (see Table 4.1). Just over half of the ERF preschools in the study had a single source of other government funding, and just over 40 percent had two or more other government funding sources. There were no differences in the number of other government-funding sources for ERF and non-ERF preschools: both on average received funds from approximately 1.6 other government sources.

Table 4.1. Number of different sources of other government funding for preschools, by ERF funding status

| | All preschools | ERF preschools | Non-ERF preschools | P-value[1] |
|---|---|---|---|---|
| Number of other government funding sources | | | | |
| 0 | 3.8% | 4.7% | 3.0% | |
| 1 | 53.4% | 53.1% | 53.7% | |
| 2 | 26.0% | 26.6% | 25.4% | |
| 3 | 15.3% | 14.1% | 16.4% | |
| 4 | 1.5% | 1.6% | 1.5% | |
| Mean number (standard deviation) | 1.57 (0.85) | 1.55 (0.85) | 1.60 (0.85) | 0.74 |
| Sample size | 131 | 64 | 67 | |

[1]P-value is based on Student's t-test.
SOURCE: Spring surveys of preschool directors.

According to their directors, many ERF preschools received funding from state and local education agencies (56 percent), state child-care funds (38 percent), or Head Start (36 percent) (see Table 4.2). Federal Even Start and county or city governments were less common sources of funding, accounting for 7.8 percent and 6.3 percent of funded sites, respectively. Unfunded applicant sites did not significantly differ from ERF sites in the sources of funding received.

Table 4.2. Types of other government funding sources received by preschools, by ERF funding status (as percent of preschools receiving each source of funding)

| | All preschools | ERF preschools | Non-ERF preschools | P-value[1] |
|---|---|---|---|---|
| Other government funding source | | | | |
| State and local education agency[2] | 52.7% | 56.3% | 49.3% | 0.42 |
| Child care[3] | 39.7% | 37.5% | 41.8% | 0.62 |
| Federal Head Start program | 36.6% | 35.9% | 37.3% | 0.87 |
| Other | 13.0% | 10.9% | 14.9% | 0.50 |
| County or city government | 8.4% | 6.3% | 10.4% | 0.39 |
| Federal Even Start program | 6.9% | 7.8% | 6.0% | 0.68 |
| Sample size | 131 | 64 | 67 | |

[1] All p-values are based on chi-squared tests of association.
[2] Funds from state and local education agencies include funds from state education agencies, independent school districts, and other sources, channeled through the state education agency.
[3] Child-care funds include state child-care funds and child-care vouchers.
SOURCE: Spring surveys of preschool directors.

Table 4.3 presents data about the extent to which preschools combine funding from Head Start, state or local education agencies, and child-care funds and the manner in which those funds are combined. Of the ERF preschools receiving Head Start funding, approximately one-half relied on Head Start as their only other source; of the ERF preschools receiving funding from state or local education agencies, approximately one-half relied on that as their only other source. However, among the preschools that received funding through child-care subsidies, a much lower percentage—just over 20 percent—relied solely on those subsidies as their only other source of funding. Unfunded applicant sites did not differ significantly from ERF sites in how funding sources were combined.

Table 4.3. Overlap in sources of funding from Head Start, state or local education agencies, and child-care funds for preschools, by ERF funding status

| | All preschools | ERF preschools | Non-ERF preschools | P-value[1] |
|---|---|---|---|---|
| Funding source | | | | |
| Head Start | 36.6% | 35.9% | 37.3% | 0.87 |
| Head Start only | 18.3% | 17.2% | 19.4% | 0.74 |
| Head Start & state or local education agency funds | 7.6% | 3.1% | 11.9% | 0.06 |
| Head Start & child-care funds | 3.0% | 4.7% | 1.5% | 0.28 |
| State or local education agency funds[2] | 52.7% | 56.3% | 49.3% | 0.42 |
| State or local education agency funds only | 21.4% | 26.6% | 16.4% | 0.16 |
| State or local education agency funds & child-care funds | 5.3% | 7.8% | 2.9% | 0.21 |
| Child-care funds[3] | 39.7% | 37.5% | 41.8% | 0.62 |
| Child-care funds only | 11.5% | 7.8% | 14.9% | 0.20 |
| Sample size | 131 | 64 | 67 | |

[1] All p-values are based on chi-squared tests of association.
[2] Funds from state and local education agencies include funds from state education agencies, independent school districts, and other sources, channeled through the state education agency.
[3] Child-care funds include state child-care funds and child-care vouchers.
SOURCE: Spring surveys of preschool directors.

## Program Operating Schedules

Data from the Head Start FACES 2000 study indicate that the provision of full-day Head Start services was correlated with greater cognitive gains.[36] Children in full-day Head Start classes showed larger fall-to-spring gains in letter recognition and early-writing skills than those in part-day classes. Although causal inferences cannot be drawn from this correlational study within the context of this research, it is interesting to document the number of operating days per year and hours of operation per day for the schools in our sample as important descriptive characteristics. The survey data indicate that three-quarters of ERF preschools operate for a full day (defined as open 6 or more hours per day) and about half (51 percent) operate for part of a year (see Table

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[36] U.S. Department of Health and Human Services (May 2003). *Head Start FACES 2000: A Whole Child Perspective on Program Performance*.
(http://www.acf.hhs.gov/programs/opre/hs/faces/reports/faces00_4thprogress/faces00_title.html)

4.4). On average, ERF preschools are open for 8 hours a day. The majority (73 percent) of the ERF-funded preschools are open 5 days a week. The ERF preschools are open for an average of 42 weeks a year, with the number of weeks of operation ranging from 27 to 52.

While we observed no significant differences between funded and unfunded preschools in the average number of hours they were open per day and the weeks they were open per year, a significantly higher proportion of non-ERF preschools were open 5 days a week compared to ERF preschools (88 percent versus 73 percent), and the mean number of operating days per week was correspondingly greater in the non-ERF funded preschools (4.9 days versus 4.7 days).

Table 4.4. Periods of operation of preschools participating in the ERF evaluation, by ERF funding status

| | All preschools | ERF preschools | Non-ERF preschools | P-value[1] |
|---|---|---|---|---|
| Hours of operation per day | | | | |
| < 3.5 hours | 6.2% | 1.6% | 10.6% | |
| 3.5 to 5.9 hours | 13.8% | 23.4% | 4.5% | |
| 6 to 8.9 hours | 41.5% | 37.5% | 45.5% | |
| ≥ 9 hours | 38.5% | 37.5% | 39.4% | |
| Median | 7.0 | 7.0 | 7.5 | |
| Mean (SD) | 7.9 (3.0) | 7.9 (3.0) | 7.9 (3.0) | 0.99 |
| Sample size | 130 | 64 | 66 | |
| Days of operation per week | | | | |
| 3 days | 2.3% | 3.1% | 1.5% | |
| 4 days | 16.8% | 23.4% | 10.4% | |
| 5 days | 80.9% | 73.4% | 88.1% | |
| Mean (SD) | 4.8 (0.5) | 4.7 (0.5) | 4.9 (0.4) | 0.05 |
| Sample size | 131 | 64 | 67 | |
| Weeks of operation per year: | | | | |
| < 40 | 50.4% | 50.8% | 50.0% | |
| ≥ 40 | 49.6% | 49.2% | 50.0% | |
| Mean (SD) | 41.9 (7.9) | 41.8 (7.8) | 42.0 (8.0) | 0.89 |
| Sample size | 125 | 61 | 64 | |

[1] P-values are based on Student's t-test.
NOTE: Head Start defines a full-day program as 6 hours or more and a part-time program as at least 3.5 hours.
SOURCE: Spring surveys of preschool directors.

## Class Size, Composition, and Adult Supervision

Class size and staff-to-child ratios are important components of the quality standards for early-childhood programs (Barnett, Schulman, and Shore 2004; NICHD Early Child Care Research Network 1999). In this section, we describe the size and composition of classrooms in the study sample. Of the 194 classrooms in the study sample, 92 received ERF funding, and 102 did not. All were preschool classes serving the study's target population of children who were expected to attend kindergarten in the following school year—most, but not all, of whom were 4 years old in fall 2004.

Some research has found that lower group sizes and better staff-to-child ratios in early-childhood settings are positively correlated with children's language, cognitive, and social functioning[37] (Barnett, Schulman, and Shore 2004; NICHD Early Child Care Research Network 1999 and 2002; Vandell and Wolfe 2000). According to the widely used guidelines of the National Association for the Education of Young Children (NAEYC), 4-year-old children should be in groups of 16 to 20 children, with a staff-to-child ratio between 1:8 and 1:10.[38] All groups, regardless of age, should have at least two teachers. Overall, the majority (63.5 percent) of ERF classrooms met or exceeded these criteria. Although causal inferences cannot be drawn from these correlational studies, it is useful to document group sizes and staff-to-child ratios in the context of this literature.

The number of children enrolled in the ERF preschool classes varied from as few as 6 per class to as high as 48 per class (see Table 4.5). The average class size was 23 children, but class size varied tremendously. Sixty-two percent of the children were enrolled in classes of 20 or fewer children (the NAEYC criteria for a high-quality program). On average, there were 3 special needs children per ERF classroom. Because of the criteria used to select classrooms for this study, the overwhelming majority (96 percent) of classes included 4-year-old children. There were no significant differences between ERF and non-ERF classrooms along any of these dimensions.

Table 4.5. Classroom characteristics, by ERF funding status

| | All classrooms | ERF classrooms | Non-ERF classrooms | P-value |
|---|---|---|---|---|
| Number of children enrolled in the class | | | | |
| Less than 16 | 15.0% | 13.1% | 16.7% | |
| 16 to 20 | 46.9% | 48.9% | 45.1% | |
| More than 20 | 38.1% | 38.0% | 38.2% | |
| Mean (SD) | 22.6 (8.8) | 22.7 (8.9) | 22.4 (8.6) | 0.81 |
| Range | 6 to 48 | 8 to 44 | 6 to 48 | |
| Number of special needs children enrolled in the class | | | | |
| 0 | 28.9% | 26.1% | 31.4% | |
| 1 or 2 | 32.0% | 33.7% | 30.4% | |
| 3 or 4 | 10.3% | 10.9% | 9.8% | |
| 5 or 6 | 10.3% | 13.0% | 7.8% | |
| 7 to 9 | 4.1% | 5.4% | 2.9% | |
| 10 or more | 6.2% | 4.3% | 7.8% | |
| Mean (SD) | 2.8 (3.9) | 2.8 (4.2) | 2.7 (3.6) | 0.82 |

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[37] Several organizations, including the National Association for the Education of Young Children, set standards for a voluntary early childhood program accreditation process. State regulations on teacher-child ratios and class size in early childhood programs vary widely (Vandell and Wolfe, 2000).

[38] The National Institute for Early Education Research uses similar benchmarks in their Quality Standards Checklist for state pre-K programs: maximum class size should be 20 or lower, and staff-to-child ratio should be 1:10 or lower (National Institute for Early Education Research, 2006, p. 32).

Table 4.5. Classroom characteristics, by ERF funding status—*Continued*

| | All classrooms | ERF classrooms | Non-ERF classrooms | P-value |
|---|---|---|---|---|
| Percentage of children enrolled in the class who are special needs | | | | |
| 0 percent | 28.9% | 26.1% | 31.4% | |
| 1 to 10 percent | 28.4% | 30.4% | 26.5% | |
| 11 to 20 percent | 14.4% | 16.3% | 12.7% | |
| 21 percent or more | 20.0% | 20.7% | 19.6% | |
| Missing | 8.3% | 6.5% | 9.8% | |
| Mean (SD) | 12.4 (15.8) | 12.8 (15.3) | 12.0 (16.4) | 0.75 |
| Ages of children enrolled in the class | | | | 0.10[1] |
| 3-year-olds only | 0.5% | 1.1% | 0.0% | |
| 4-year-olds only | 6.2% | 4.3% | 7.8% | |
| 5-year-olds only | 2.6% | 3.3% | 2.0% | |
| 3- and 4-year-olds | 7.2% | 3.3% | 10.8% | |
| 3- and 5-year-olds | 0.0% | 0.0% | 0.0% | |
| 4- and 5-year-olds | 48.5% | 56.5% | 41.2% | |
| 3-, 4-, and 5-year-olds | 35.1% | 31.5% | 38.2% | |
| Number of paid staff members usually in the class | | | | |
| 1 | 11.9% | 10.9% | 12.7% | |
| 2 | 59.8% | 65.2% | 54.9% | |
| 3 | 18.6% | 13.0% | 23.5% | |
| 4 or more | 9.8% | 10.9% | 8.8% | |
| Mean (SD) | 2.3 (0.9) | 2.3 (0.8) | 2.3 (0.9) | 0.56 |
| Staff-to-child ratio in the class | | | | |
| 1:10 or less | 66.0% | 68.5% | 63.7% | 0.49 |
| Mean (SD) | 10.9 (5.5) | 11.1 (5.8) | 10.8 (5.3) | 0.74 |
| Number of children absent on a typical day | | | | |
| 0 | 12.4% | 17.4% | 7.8% | |
| 1 or 2 | 71.1% | 70.7% | 71.6% | |
| 3 or 4 | 8.2% | 6.5% | 9.9% | |
| 5 or 6 | 2.1% | 1.1% | 2.9% | |
| Mean (SD) | 2.0 (0.6) | 1.9 (0.5) | 2.1 (0.6) | 0.03 |
| Sample Size | 194 | 92 | 102 | |

[1] This p-value is based on chi-squared test of association; all other p-values are based on Student's t-tests.
SOURCE: Spring surveys of preschool teachers.

The number of paid staff members per class as reported by teachers varied, although the majority of classes (65 percent) were staffed by two teachers (see Table 4.5). Perhaps a more useful metric is the staff-to-child ratio in a classroom. Just over 68 percent of the ERF-funded classrooms maintained a ratio of one teacher to 10 or fewer children, the professionally accepted upper limit for ratios in preschool classrooms serving 4-year-olds. Differences between ERF and non-ERF classrooms were not statistically significant along any of these dimensions.
The one characteristic for which we observed a statistically significant difference between the ERF-funded and unfunded classrooms was in the area of child absenteeism. On a typical day, the unfunded classrooms reported a higher absentee rate than the funded classrooms. However, in

practical terms, the number of students absent on a typical day was close to two children, regardless of funding status.

## Characteristics of Teachers

This section focuses on the teachers in the classrooms of the children selected for the evaluation. Differences that we observed could be due to existing baseline differences, or they could be due to early effects of ERF. A description of the characteristics of the teachers and of significant differences between teachers in ERF-funded and unfunded classrooms is important in determining whether ERF might have influenced any factors that could impact the outcomes for children.

Several correlational studies indicate that higher levels of teacher education are associated with teacher quality and child outcomes.[39] The research linking teachers' level of education to classroom quality is not consistent, and causal inferences cannot be drawn, given the correlational nature of these studies.[40] Within the context of this literature, it is useful to document the educational level of ERF teachers. Three-quarters the teachers in ERF preschools had earned bachelor's degrees, and an additional 12 percent held associate's degrees (see Table 4.6).[41] Teachers in ERF preschools had much more formal education than Head Start teachers in the FACES 2000 sample, in which approximately 25 percent of the staff who provided instruction in the classroom (administrative teachers and classroom teachers) had bachelor's degrees.[42]

The largest percentage of ERF teachers held degrees in early-childhood education (38 percent), followed by elementary education (22 percent), and education (10 percent). Among teachers in ERF classrooms, 87 percent have completed college-level courses in early-childhood education or development, 67 percent have completed courses in teaching reading to elementary-school children, and 79 percent have completed courses in teaching language and literacy skills to children in a preschool setting.

In addition, 30 percent of the teachers in the ERF sites held a child-development associate credential, 42 percent held a state-awarded preschool certificate, 67 percent held a teaching certificate or license, and 24 percent held other types of job-related licenses. Finally, 42 percent of the ERF teachers in the sample were currently enrolled in teacher-related training.

Compared to teachers in non-ERF classrooms, more teachers in ERF classrooms had earned bachelor's degrees, held teaching certificates or licenses, and were currently enrolled in teacher-related training or education. We cannot definitively determine which of these differences preceded ERF funding and which were a direct result of the grant. It is unlikely that ERF

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[39] Barnett, W.S. (2004). "Better teachers, better preschools: Student achievement linked to teacher qualifications." In *Preschool Policy Matters (2)*. New Brunswick, NJ: National Institute for Early Education Research.
[40] Early, D., Bryant, D., Pianta, R., Clifford, R., Burchinal, M., Ritchie, S., Howes, C., and Barbarin, O. (2006). "Are teachers education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten?" *Early Childhood Research Quarterly*, *21*, 175–195.
[41] These results were reported by teachers in a survey and were not independently verified.
[42] U.S. Department of Health and Human Services (January 2002), *A Descriptive Study of Head Start Families: FACES Technical Report I*, January 2002, p. 206.

influenced the attainment of bachelor's degrees or teaching certificates, because the ERF funding had not been available for a sufficiently long period of time for the teachers to have obtained the credentials under the auspices of ERF funding.

Table 4.6. Educational background of teachers and others, by ERF funding status

| | All teachers | ERF teachers | Non-ERF teachers | P-value[1] |
|---|---|---|---|---|
| Highest degree | | | | < 0.01 |
|     High-school diploma | 4.1% | 4.3% | 3.9% | |
|     Vocational- or technical-school diploma | 1.0% | 0.0% | 2.0% | |
|     Some college, no degree | 13.4% | 8.7% | 17.6% | |
|     Associate's degree | 16.0% | 12.0% | 19.6% | |
|     Bachelor's degree | 37.1% | 45.7% | 29.4% | |
|     Graduate or professional school, no degree | 8.2% | 14.1% | 2.9% | |
|     Master's or law degree | 21.1% | 15.2% | 24.5% | |
| Field in which highest degree was earned | | | | 0.14 |
|     Child development / developmental psychology | 6.2% | 4.3% | 7.8% | |
|     Early-childhood education | 33.0% | 38.0% | 28.4% | |
|     Elementary education | 20.1% | 21.7% | 18.6% | |
|     Education, other | 9.3% | 9.8% | 8.8% | |
|     Psychology, other | 2.1% | 3.3% | 1.0% | |
|     Social sciences, liberal arts, languages | 5.7% | 7.6% | 3.9% | |
|     Business administration, management | 4.1% | 1.1% | 6.9% | |
|     Professional | 1.0% | 1.1% | 1.0% | |
|     No degree | 18.6% | 13.0% | 23.5% | |
| Completed 6 or more college courses in relevant fields: | | | | |
|     Early childhood education or development | 85.6% | 87.0% | 84.3% | 0.60 |
|     Teaching reading to elementary school children | 65.5% | 67.4% | 63.7% | 0.59 |
|     Teaching language and literacy skills to children in a preschool setting | 73.7% | 79.3% | 68.6% | 0.09 |
| Earned a credential, certificate, or license | | | | |
|     Child Development Associate (CDA) credential | 33.5% | 30.4% | 36.3% | 0.39 |
|     State-awarded preschool certificate | 43.3% | 42.4% | 44.1% | 0.81 |
|     Teaching certificate or license | 58.8% | 67.4% | 51.0% | 0.02 |
|     Other job-related licenses | 20.1% | 23.9% | 16.7% | 0.21 |
|     None of the above | 16.5% | 12.0% | 20.6% | 0.11 |
|     Sample Size | 194 | 92 | 102 | |

[1] All p-values are based on chi-squared tests of association.
SOURCE: Spring surveys of preschool teachers.

As shown in Table 4.7, the overwhelming majority (97 percent) of ERF teachers are women. They range in age from 23 to 67 years; the average teacher is 41 years old. The largest percentage of the ERF teachers are white (54 percent), and fewer than a quarter are either Hispanic (23 percent) or black (17 percent). Although the majority of teachers (73 percent) are

monolingual English speakers, a sizeable proportion (21 percent) reported being fluent in both Spanish and English. These numbers are important to keep in mind in light of the findings reported in Chapter 3 that over 43 percent of the overall sample of children are Hispanic. We did not observe any statistically significant differences in demographic characteristics between teachers in the funded sites and those in the unfunded sites.

Table 4.7. Demographic characteristics of teachers, by ERF funding status

| Characteristic | All teachers | ERF teachers | Non-ERF teachers | P-value |
|---|---|---|---|---|
| Gender | | | | |
| Female | 95.9% | 96.7% | 95.1% | 0.57 |
| Age | | | | |
| 20 through 29 years | 19.9% | 22.2% | 17.8% | |
| 30 through 39 years | 23.6% | 21.1% | 25.7% | |
| 40 through 49 years | 29.8% | 36.7% | 23.8% | |
| 50 through 59 years | 18.8% | 13.3% | 23.8% | |
| 60 and older | 7.9% | 6.7% | 8.9% | |
| Mean (SD) | 41.6 (11.3%) | 40.8 (10.9%) | 42.4 (11.6%) | 0.34[1] |
| Range (years) | 23 to 67 | 23 to 67 | 23 to 64 | |
| Ethnicity | | | | |
| American Indian or Alaska Native | 3.1% | 3.3% | 3.0% | |
| Asian | 1.6% | 2.2% | 1.0% | |
| Non-Hispanic black or African American | 21.8% | 17.4% | 25.7% | |
| Native Hawaiian or Pacific Islander | 0.0% | 0.0% | 0.0% | |
| Non-Hispanic white | 51.3% | 54.3% | 48.5% | |
| Hispanic | 22.3% | 22.8% | 21.8% | 0.68 |
| Missing | 0.5% | 0.0% | 0.9% | |
| Languages spoken fluently | | | | |
| English only | 74.7% | 72.8% | 76.5% | |
| Spanish only | 2.1% | 3.3% | 1.0% | |
| English and Spanish | 20.6% | 20.7% | 20.6% | |
| English and other | 2.6% | 3.3% | 2.0% | 0.65 |
| Sample Size | 194 | 92 | 102 | |

[1] This p-value is based on Student's t-tests; all other p-values are based on chi-squared test of association.
SOURCE: Spring surveys of preschool teachers.

# Chapter 5. Professional Development, Instructional Practices, and Classroom Environments in ERF Preschools

To meet the goals of Early Reading First, grantees are expected to create high-quality oral-language and literature-rich classroom environments that offer activities and instructional materials to develop children's oral language, phonological awareness, print awareness, and alphabetic knowledge. ERF funds were awarded in October 2003, and grantees were expected to fully implement programs by January 2004. Accordingly, both the fall 2004 and spring 2005 data collections measure the professional development activities, curriculum and assessment choices, classroom materials, and instructional practices of fully implemented ERF programs.

In this chapter, we describe teachers' professional development activities and the curriculum and assessment choices that are intended to help support the quality of the classroom environments in terms of organization, interactions, language, and early literacy instruction. We also describe the characteristics of ERF preschool classrooms associated with dimensions of interest (classroom organization, variety of activities, and supportive teacher-child interactions) to early-childhood professionals. We describe the preschool classrooms in terms of observed teacher instruction and available classroom materials associated with the goals of ERF: the classroom language environment and the opportunities for developing early literacy skills.[43] The impacts of ERF are presented in Chapters 6 and 7.

## Professional Development Experiences

ERF grantees were required by statute to provide professional development. In its guidance to ERF grantees, ED recommended in accordance with the statutory definition of the term (section 9101(34), ESEA) that professional development be ongoing, sustained, intensive, and classroom focused. ED policy guidance lists mentoring or coaching as examples of professional development methods based on scientifically-based reading research (U.S. Department of Education, 2003).

ERF teachers reported receiving an average of 72 hours of professional development during the previous year—the equivalent of 9 days (see Table 5.1).

Table 5.1. Hours of professional development in language and literacy topics received in the past 12 months, by ERF teachers

| Hours of training | |
|---|---|
| Median | 55.0 |
| Mean | 71.5 |
| Standard deviation | 84.7 |
| Sample size | 86 |

SOURCE: Spring teacher surveys.

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[43] For the interested reader, Appendix G provides descriptive tables comparing the funded and unfunded classrooms on the variables discussed in this chapter.

One hundred percent of teachers in ERF-funded classrooms reported receiving professional development in phonemic and phonological awareness. The vast majority of ERF teachers received training in six other language-development and early literacy topics, including literacy-rich print environments (97.8 percent), concepts of print writing and prewriting (96.7 percent), oral language (96.7 percent), facilitating emergent literacy (95.7 percent), alphabetic knowledge (92.4 percent), and oral comprehension and cognition (88.0) (see Table 5.2). Nine out of 10 ERF teachers reported receiving training in child assessment. Three-fourths of ERF teachers reported receiving training in traditional early-childhood topics, including children's development and ways to manage children's behavior in the classroom. Most ERF teachers (77 percent) reported receiving training on 9 or 10 professional development topics that were included in the list.

Table 5.2. Topics in which ERF teachers received professional development in the past 12 months

| Topic areas | % ERF teachers who received training in topic |
| --- | --- |
| Language Development and Early Literacy | |
| Phonemic & phonological awareness | 100.0 |
| Literacy-rich environments | 97.8 |
| Concepts of print writing & prewriting | 96.7 |
| Oral language | 96.7 |
| Facilitating emergent literacy | 95.7 |
| Alphabetic knowledge | 92.4 |
| Oral comprehension & cognition | 88.0 |
| Child Assessment | |
| Child Development and Behavior | 90.2 |
| Early childhood growth & development | 76.1 |
| Classroom management | 76.1 |
| Other Topics | 56.5 |
| **Number of topics** | **% ERF teachers who received training in number of topics** |
| 0 | 0.0 |
| 1 to 4 | 1.1 |
| 5 to 8 | 21.7 |
| 9 or 10 | 77.2 |
| Mean # of topics (SD) | 9.6 (1.7) |
| Sample Size | 92 |

SOURCE: Spring teacher surveys.

ERF teachers reported that most of the professional development topics on which they received training were covered through in-service training (see Table 5.3). Teachers potentially could have received professional development training in 11 areas, including topics that fell under the "other" category. In-service training covered an average of 7.6 out of 11 topics. Several topics were also covered by mentoring or tutoring (4.7 out of 11 topics) and by workshops (4.5 out of 11 topics). While these patterns reflect the flexibility of each training method in covering a variety of topics, it may not reflect the relative number of hours teachers participated in each type of training. We did not ask teachers how their professional development hours were distributed across the various types of training.

Table 5.3. Mean number of professional development topics for ERF Teachers, by method of training

| Training method | Mean number of topics (SD) |
|---|---|
| In-service | 7.60 (3.48) |
| Mentor or tutor | 4.73 (4.54) |
| Workshops | 4.52 (4.42) |
| Continuing education courses | 2.48 (4.00) |
| National meetings | 1.20 (2.81) |
| Other | 0.55 (1.76) |
| Sample Size | 92 |

SOURCE: Spring teacher surveys.

Formal education was a substantial source of professional development for ERF teachers. ERF teachers reported that they received training on an average of 2.5 topics through continuing-education courses. More than 40 percent of ERF teachers reported taking courses toward certification or degree programs in the past year (see Table 5.4). Many (17 percent) ERF teachers were working toward a graduate degree.

Table 5.4. Current ERF teacher enrollment in formal education

| | % of ERF teachers currently enrolled |
|---|---|
| Any teacher-related training or education | 42.4 |
| Type of formal education | |
| Child development associate (CDA) | 4.3 |
| Teaching certificate program | 2.2 |
| Special education teaching degree | 0.0 |
| Associate's degree | 0.0 |
| Bachelor's degree | 5.4 |
| Graduate degree | 17.4 |
| Other | 13.0 |
| Sample size | 92 |

SOURCE: Spring teacher surveys.

ERF teachers' professional development activities were funded by a variety of sources (see Table 5.5). Teachers in nearly all of the ERF programs received training funded by ERF on multiple topics. Except for ERF funds, school district and Head Start funds were the most widely used sources for teachers in ERF programs, paying for training of 56.5 percent and 31.5 percent of ERF teachers, respectively. This is consistent with the finding in Chapter 4 that many preschools in the sample received state or local education funding or Head Start funding (or both). Notably, approximately 1 in 10 teachers paid for his or her own professional development on at least one of the topics. Because we do not know how the hours of professional development activities were covered by various funding sources, this descriptive analysis cannot assess the extent to which ERF might have contributed to the professional development hours reported by teachers. We address the question of how ERF influenced teachers' professional development in the impact analysis in Chapter 6.

Table 5.5. Sources of funding for professional development for ERF teachers, by number of topics

| Funding source | % ERF teachers receiving training on topics thru funding source |
|---|---|
| ERF | |
|     No topics | 17.4 |
|     One topic | 0.0 |
|     Multiple topics | 82.6 |
| School district | |
|     No topics | 43.5 |
|     One topic | 6.5 |
|     Multiple topics | 50.0 |
| Head Start | |
|     No topics | 68.5 |
|     One topic | 4.3 |
|     Multiple topics | 27.2 |
| State | |
|     No topics | 80.4 |
|     One topic | 2.2 |
|     Multiple topics | 17.4 |
| Teacher (self) | |
|     No topics | 87.0 |
|     One topic | 4.3 |
|     Multiple topics | 8.7 |
| Other | |
|     No topics | 82.6 |
|     One topic | 10.9 |
|     Multiple topics | 6.5 |
| Sample Size | 92 |

SOURCE: Spring teacher surveys.

## Curricula and Assessment Practices

The statute requires ERF grantees to identify and provide activities and instructional materials that are designed according to scientifically based reading research for developing children's oral language, phonological awareness, print awareness and alphabet knowledge. ERF programs are also required to use assessments to monitor children's attainment of skills and to guide instruction.[44] ERF programs are expected to integrate assessments of child progress with teaching so that instruction can build on what children already know and bring them to the next level (U.S. Department of Education 2003.) Accordingly, the choice of assessments is important in providing critical information about children's progress and about useful next steps in supporting their learning. The following section describes curricula and assessment instruments used in the ERF classrooms.

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[44] U.S. Department of Education. *Guidance for the Early Reading First Program*. Washington, DC, March 2003, p. 5.

**Curricula Used by Teachers**

Recommendations for the practice of early-childhood education call for a classroom curriculum that articulates learning objectives and that teachers can use to plan daily activities for preschool-age children throughout the year.[45] A widely used set of professional guidelines recommends choosing a curriculum that is consistent with the program's goals for children's development across the cognitive, language, social, emotional, and physical domains.[46]

Guidance from ED recommended that ERF teachers "organize and present instructional materials in a systematic and coherent manner." ED's guidance specified that curricula should be "intellectually engaging, have meaningful content, and provide multiple opportunities for developing phonological awareness, print awareness, oral-language skills, and alphabet knowledge, including the use of explicit, contextualized, and scaffolded instruction."[47] In their grant applications, some grantees explicitly said that they sought ERF funding to support the purchase and implementation of a new curriculum designed according to scientifically based reading research, either as a replacement or a supplement for a curriculum that they were already using. The legislation that authorized ERF and the written guidance from ED to ERF grantees do not recommend particular curricula.[48]

All ERF teachers reported using a curriculum (see Table 5.6). In ERF preschool classrooms, 39 percent of the teachers reported following one curriculum, and 61 percent reported using a combination of curricula.

Table 5.6. Number of curricula used by ERF teachers

| | |
|---|---|
| % ERF teachers using | |
| A single curriculum | 39.1 |
| A combination of curricula | 60.9 |
| No curriculum | 0.0 |
| Average number of curricula used (SD) | 1.88 (1.00) |
| Sample Size | 92 |

SOURCE: Spring teacher surveys.

Most ERF teachers used the Creative Curriculum or the High/Scope (Educating Young Children) curriculum (see Table 5.7). Roughly 46 percent of the teachers used the Creative Curriculum; 24 percent used the High/Scope curriculum. The widespread use of these two curricula is consistent with reported curriculum choices among a nationally representative sample of Head

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[45] For example, Head Start Program Performance Standards require that programs have a curriculum, but do not prescribe one. (*Head Start FACES 2000: A Whole-Child Perspective on Program Performance*, Fourth Progress Report. U.S. Department of Health and Human Services, Washington, DC, May 2003). In addition, non-regulatory guidance for Title I preschools recommends that the preschools use a curriculum. (*Serving Children Under Title I: Non-Regulatory Guidance*. U.S. Department of Education Washington, DC, March 2004.)

[46] *NAEYC Early Childhood Program Standards and Accreditation Criteria: The Mark of Quality in Early Childhood Education*. Washington, DC: National Association for the Education of Young Children (NAEYC), 2005.

[47] U.S. Department of Education March 2003, p. 9.

[48] No Child Left Behind Act of 2001, Sections 1221 and 1222 and U.S. Department of Education, March 2003.

Start programs. In the Head Start Family and Child Experiences Study (FACES) 2000 cohort, 59 percent of Head Start teachers reported using either the Creative Curriculum or High/Scope.[49]

For language and early literacy, each of four curricula was used by more than 10 percent of the teachers in ERF programs: Building Language for Literacy (an online early literacy activity site designed for children to use); Doors to Discovery (curriculum and materials to foster language and early literacy); Let's Begin with the Letter People (a language and literacy curriculum with materials that include "letter people"), and Opening the World of Learning (a curriculum with books, songs, and poetry to foster language and literacy).

Table 5.7. Curricula used by ERF teachers

| Curriculum | % of ERF teachers using |
|---|---|
| Creative Curriculum | 45.7 |
| High/Scope (Educating Young Children) | 23.9 |
| Building Language for Literacy | 16.3 |
| Doors to Discovery | 15.2 |
| Let's Begin with the Letter People | 15.2 |
| Opening the World of Learning | 12.0 |
| We Can! | 8.7 |
| DLM Early Childhood Express | 7.6 |
| Breakthrough to Literacy | 6.5 |
| Creating Child-Centered Classrooms | 4.3 |
| Scholastic Curriculum | 3.3 |
| CIRCLE | 3.2 |
| SRA Open Court Reading | 2.2 |
| Montessori | 2.2 |
| High Reach Learning | 0.0 |
| Other | 21.7 |
| Sample Size | 92 |

NOTE: Percentages exceed 100 because teachers may be using multiple curricula. "Other" includes all curricula reported by four or fewer teachers.
SOURCE: Spring teacher surveys.

## Assessment Usage

The statute requires ERF programs to acquire, provide training on, and use screening assessments or other appropriate measures designed according to scientifically based reading research to determine whether preschool age children are developing the cognitive skills they need for later reading success. ED's guidance reiterates that requirement and states that teachers are expected to be trained on using the assessments and to use the assessments to tailor a plan of instruction to the needs of individual children.[50] ED did not require the FY 2003 grantees to use any specific child assessment tools.[51]

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[49] U.S. Department of Health and Human Services (2003), *Head Start FACES 2000: A Whole-Child Perspective on Program Performance*, Fourth Progress Report.
[50] U.S. Department of Education (2003), *Guidance for the Early Reading First Program*, p. 9.
[51] Early Reading First 2005 and 2006 Performance Plans (U.S. Department of Education 2004 and 2005), accessed at http://www.ed.gov/about/reports/annual/2006plan/edlite-g2eseaearlyread.html ...*Footnote continued on page 40.*

Nearly all ERF teachers (97.8 percent) reported using at least one assessment tool for children in their classes, reflecting the current interest in at least screening children's developmental progress during the preschool year (see Table 5.8). Since the Head Start program's reauthorization in 1998, teachers have been required to assess all children in their classes (using tools of their choice) on a broad range of outcomes and to use the information to plan instruction. Many curricula, including the two most widely used curricula, include assessment tools that reflect the curriculum's learning goals. Results of these assessments are intended to help teachers tailor the curriculum and instruction to children's developmental levels.

Table 5.8. Number of assessments used by ERF Teachers

|  | % of ERF teachers using |
| --- | --- |
| Assessments per classroom: |  |
| No assessment | 2.2 |
| Single assessment | 33.7 |
| Combination assessments | 64.1 |
| Mean (SD) | 2.11 (1.21) |
| Sample Size | 92 |

SOURCE: Spring teacher surveys.

A majority of ERF teachers (64 percent) reported using more than one assessment instrument with children in their classes. Among the most commonly used were the assessment tools associated with the two most widely used curricula; 26 percent of teachers used the Child Observation Record (the assessment tool accompanying the High/Scope curriculum), and 22 percent used the Creative Curriculum Continuum (the assessment tool accompanying the Creative Curriculum) (see Table 5.9).

Substantial percentages of ERF teachers reported using several other assessment tools, including those that focus specifically on language and early literacy skills. The Peabody Picture Vocabulary Test (used by 34 percent of teachers) is a vocabulary assessment with national norms to help interpret children's progress over the course of the year. The Preschool Individual Growth & Development Inventory  (used by 22 percent of teachers) measures language through picture naming and measures phonemic awareness through rhyming and alliteration. The Phonological Awareness Literacy Screening—Pre-K (used by 17 percent of teachers) focuses on alphabet knowledge, beginning sounds, print and word awareness, and rhyme awareness. The Teacher Rating of Oral Language and Literacy (TROLL) (used by 12 percent of teachers) rates the child's language use, early reading, and early writing skills. The Work Sampling System (used by 12 percent of teachers) uses observational checklists, portfolios, and teacher and parent summaries to assess the child's development across the full range of outcome domains. The Desired Results assessment (used by nearly 10 percent of teachers) has been under development for the California Department of Education to assess progress toward preschool-learning guidelines across all developmental domains.

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and http://www.ed.gov/about/reports/annual/2005plan/edlite-esea-earlyread.html. The two most recent cohorts of grantees, FY 2005 and FY 2006, must use two child assessments for the purpose of GPRA reporting: the PPVT and the Phonological Awareness Literacy Screenings (PALS) Pre-K.

Table 5.9. Instruments used to assess children's progress and needs within the previous 30 days

| Assessment Instrument | % of ERF teachers using |
|---|---|
| Peabody Picture Vocabulary Test | 33.7 |
| Child Observation Record | 26.1 |
| Creative Curriculum Continuum | 21.7 |
| Preschool Individual Growth & Development Inventory | 21.7 |
| Phonological Awareness Literacy Screening | 17.4 |
| Teacher Rating of Oral Language & Literacy | 12.0 |
| Work Sampling | 12.0 |
| Desired Results | 9.8 |
| Brigance Inventory of Early Development | 6.5 |
| Learning Accomplishment Profile—Diagnostic (LAP-D) | 4.3 |
| State- or School District-designed | 4.3 |
| Galileo | 2.2 |
| Expressive One Word Picture Vocabulary Test | 0.9 |
| Get Ready to Read | 0.0 |
| Other[1] | 28.3 |
| Sample Size | 92 |

[1] "Other" includes all assessments reported by four or fewer teachers.
SOURCE: Spring teacher surveys.

## Classroom Environments and Teacher Practices

In this section, we describe the classroom-learning environments, including the materials and physical organization of the classroom, the teacher's interactions with children, and the range and quality of instruction about early literacy topics.

Two perspectives on the classroom environment can inform our picture of the quality of ERF classrooms as environments for fostering children's language development and early literacy skills. First, research shows that some characteristics of preschools classrooms are positively correlated with child outcomes (Vandell and Wolfe 2000; NICHD Early Childhood Research Network 2002, 2003, and 2006). Given its correlational nature, this research is not conclusive. Second, ERF requires grantees to provide the types of materials, learning opportunities, and instruction that are intended to support the development of children's language and early literacy skills. ERF also requires regular progress assessments to gauge children's learning. Accordingly, our measures of teacher instructional practice focused on both the general quality of the preschool environment and on the language, early literacy, and assessment practices that are intended to support children's development of language and early literacy skills.

We obtained measures of the classroom environment and instructional practices through direct observation of the classroom and teacher. We completed observations of up to three classrooms per site in the fall and spring. The observation protocols included the Teacher Behavior Rating Scale (TBRS), developed by the Center for Improving the Readiness of Children for Learning and Education (CIRCLE) at the University of Texas-Houston (Landry et al. 2004), and a subset of items from the Early Childhood Environment Rating Scale-Revised (ECERS-R) (Harms,

Clifford, & Cryer 1998).[52] The TBRS was developed to evaluate the early literacy and language qualities in preschool classrooms, but it also includes subscales that measure the general quality of the classroom and the sensitivity of teacher behavior. We selected 11 ECERS-R items that compose the subscale, Teaching and Interactions, on the basis of a previous factor analysis of the instrument (Clifford, Barbarin, et al. 2005), which produced a single score focused on the quality of teaching and interactions in the classroom environment. The full ECERS-R score has been found to be correlated with children's cognitive and emotional outcomes in early childhood settings, although no causal inference can be drawn from these correlational studies (Vandell and Wolfe 2000).

**General Quality of the Preschool Classroom**

The ECERS-R and the TBRS provided measures of several aspects of the general quality of the preschool environment. The quality of teacher-child interactions refers to the teacher's responsiveness to children, sensitivity to children's needs, consistent, positive guidance, and encouragement. To measure teacher-child interactions, we used the Teaching and Interactions subscale of the ECERS-R (Clifford et al. 2005) and the Teacher Sensitivity subscale from the TBRS (Landry et al. 2004). We also measured the quality of the assistant teacher-child interactions through the TBRS Team Teaching subscale.

The ECERS-R scores each item on a scale ranging from 1 ("inadequate") to 7 ("excellent"). ECERS-R Teaching and Interactions subscale scores averaged 5.7 for the funded classrooms; a score of 5 on the ECERS-R is considered to be "good." Scores on the Teaching and Interactions subscale tend to be higher than scores on the full ECERS-R scale. For example, in spring 2001, Head Start classrooms in the FACES 2000 cohort sample scored an average of 5.5 on the Teaching and Interactions subscale but 4.9 on the full ECERS-R scale.[53]

Table 5.10. General quality of ERF classrooms, based on ECERS-R and TBRS subscales

|  | Mean (SD) | | |
|---|---|---|---|
|  | Fall | Spring | Diff. |
| ECERS-R Teaching and Interactions Subscale score | 5.67 (1.07) | 5.78 (1.03) | +0.12 |
| General teaching behavior | 3.14 (0.56) | 3.14 (0.52) | –0.00 |
|     Classroom community | 3.18 (0.59) | 3.19 (0.56) | +0.01 |
|     Teacher sensitivity | 3.11 (0.68) | 3.07 (0.62) | –0.04 |
| Lesson planning | 3.06 (0.81) | 3.05 (0.90) | –0.01 |
| Quality and organization of activity centers | 3.12 (0.67) | 2.93 (0.73) | –0.19 |
| Quality of team teaching | 2.98 (0.83) | 2.99 (0.88) | +0.01 |
| Math concepts | 2.33 (1.04) | 2.35 (1.01) | +0.02 |
| Total TBRS Score | 2.71 (0.61) | 2.65 (0.65) | –0.06 |
| Sample size | 78 | 78 | |

SOURCE: Fall and spring classroom observations.

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[52] Appendix C provides details on the contents and psychometric properties of the TBRS and ECERS-R.
[53] Authors' calculations using subscale-level ECERS data from the FACES 2000 Cohort microdata (U.S. Department of Health and Human Services, 2005).

The average score on the ECERS-R Teaching and Interactions subscale in the spring was 5.8 for ERF classrooms (slightly higher than in the fall) with all but 5 classrooms scoring at least a "good" or 5 on the subscale (see Figure 5.1).

**Figure 5.1. Number of ERF classrooms by ECERS-R Teaching and Interactions Subscale, spring 2005**
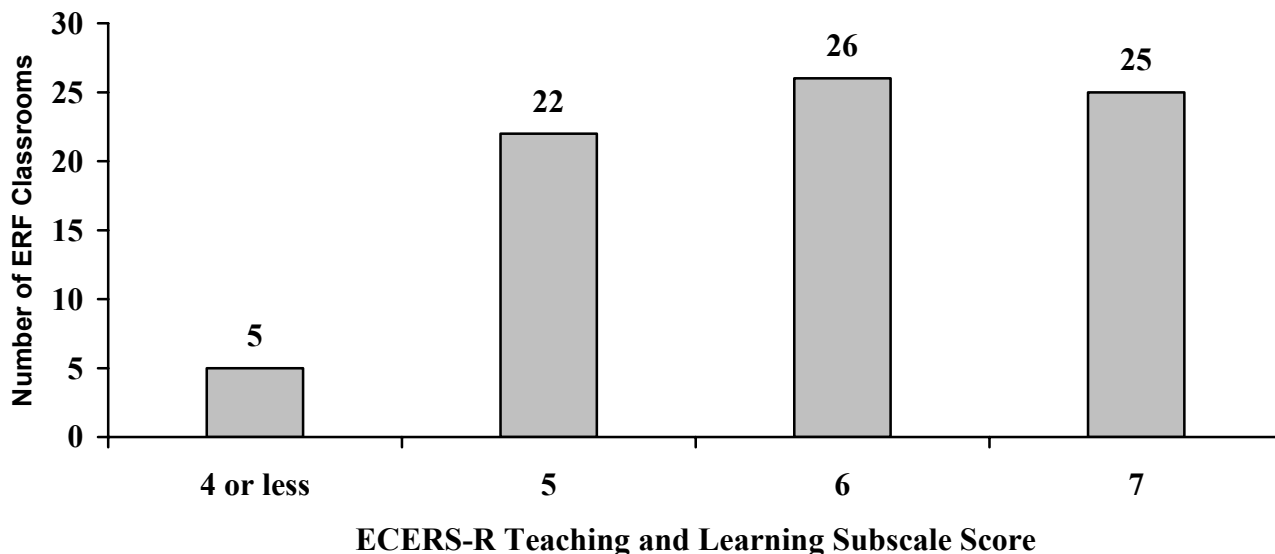


ERF classrooms have similar general quality to Head Start classrooms and better general quality than state pre-kindergarten classrooms (see Figure 5.2). The average score on the ECERS-R Teaching and Interactions subscale for ERF classrooms is similar to those of Head Start classrooms, according to data for the 2000 FACES cohort. Although the means for the ERF funded classrooms look higher, the differences between those means and that for Head Start are not statistically significant.[54] Data for a national sample of state pre-kindergarten programs have not been gathered as they have for Head Start, but a recent study of pre-kindergarten programs in six states found significantly lower ECERS-R Teaching and Interactions scores among classrooms in the study than was found among ERF classrooms (Clifford et al. 2005).[55]

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[54] Head Start data are from authors' calculations using subscale-level ECERS data from the FACES 2000 Cohort microdata (U.S. Department of Health and Human Services, 2005).
[55] States included in the study are Georgia, Illinois, Kentucky, Ohio, California, and New York.

**Figure 5.2. Average ECERS-R Teaching and Interactions Subscale Score, ERF, Head Start, and state pre-kindergarten classrooms**
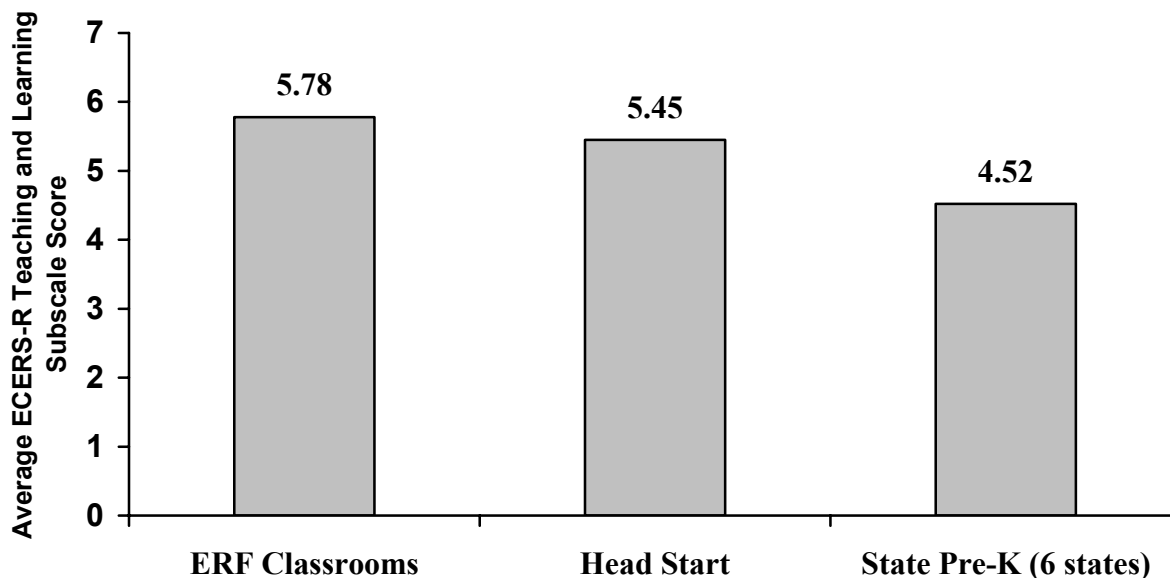


The TBRS measures several aspects of the general quality of preschool classrooms. The TBRS items are scaled so that higher values represent greater frequency or quality or both, using Likert ratings that range from 1 (low or none) to 4 (high frequency/high quality) for virtually all of the items. Because of a high correlation between quantity and quality item scores, we have averaged them to create a single-item score and created subscales from these composite items.[56]

The average score for General Teaching Behavior, which includes the subscales Classroom Community and Teacher Sensitivity, was 3.1 out of 4 among ERF classrooms in the fall (see Table 5.10). Classroom Community measures the degree to which teachers have established classroom routines for children that help to maintain a calm, orderly, and busy atmosphere throughout the preschool day. Teacher Sensitivity refers to the teacher's responsiveness and emotional supportiveness toward children. The average score for General Teaching Behavior was nearly the same in the fall and spring for ERF classrooms.

Teachers can help to maintain classroom order and prevent conflict by organizing the physical environment. To measure the extent to which teachers have organized the physical environment of the classroom into interesting, diverse, and well-placed activity centers, we used the Quality and Organization of Activity Centers subscale of the TBRS measure. The average score for the Activity Centers subscale among ERF classrooms was 3.1 out of a possible 4 in the fall and 2.9 in the spring. To measure the extent to which teachers plan a variety of learning activities and follow through with their plans, we used Lesson Planning, another subscale of the TBRS. ERF classrooms scored an average of 3.1 out of 4 in the fall and spring.

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[56] Appendix C contains additional information about the TBRS subscales used in the ERF evaluation.

Nearly all preschool classrooms are taught by a lead and assistant teacher. The assistant teacher ideally does more than provide an extra pair of hands to help keep order in the classroom. By acting as a knowledgeable teaching-team member, the assistant teacher can extend the guidance, teaching, and emotional support provided by the lead teacher. The assistant teacher can help enrich the classroom language environment and keep learning activities going in a small group after the lead teacher has moved on to another group. The TBRS Team Teaching subscale measures the assistant teacher's contributions to the language and learning environment of the classroom. ERF classrooms scored an average of 3.0 on the Team Teaching scale in both the fall and spring.

Math Concepts is a short, 2-item subscale of the TBRS that measures the extent to which the teacher incorporates mathematics concepts and activities into the preschool day. Early mathematics skills were not a focus of ERF, and they have not received much attention from early-childhood professionals. Nevertheless, because the subscale is a component of the TBRS, we include it here for completeness. ERF classrooms scored an average of 2.3 on this scale in the fall. In the spring, the average score for ERF classrooms was similar to the fall score.

**Classroom Language and Early Literacy Environment**

Several measures of the language and early literacy aspects of teacher instructional practices and the available classroom materials are available from the TBRS. Table 5.11 shows the fall and spring scores for ERF classrooms for key subscales of the TBRS that measure the language environment, early literacy materials and instruction, and child assessment.

Table 5.11. Classroom language and early literacy environment in ERF classrooms

| Subscales | Mean (SD) | | |
| --- | --- | --- | --- |
| | Fall | Spring | Difference |
| Oral Language Use by Lead Teacher | 2.99 (0.75) | 2.88 (0.71) | −0.11 |
| Book-Reading Practices | 2.34 (0.90) | 2.40 (0.83) | +0.07 |
| Phonological Awareness Activities | 2.25 (0.88) | 2.05 (1.00) | −0.20 |
| Print and Letter Knowledge | 2.32 (0.78) | 2.14 (0.83) | −0.18 |
| Written Expression | 2.47 (0.78) | 2.28 (0.91) | −0.19 |
| Child Portfolios | 2.79 (1.63) | 2.82 (1.47) | +0.03 |
| Dynamic Assessment | 2.84 (1.07) | 2.786 (1.13) | −0.05 |
| Sample size | 78 | 78 | |

SOURCE: Fall and spring classroom observations.

A high-quality language environment that includes exposure to new vocabulary, adults modeling more complex sentences for children, and encouragement of children's expression can help children to expand their vocabulary. A wider vocabulary can help children understand the information they hear in the classroom and recognize words that they sound out as they begin to read (Whitehurst and Lonigan 2001). Oral Language Use measures the language environment provided by the lead teacher in the classroom. ERF classrooms scored 3.0 out of a possible 4 on the Oral Language Use subscale in the fall and 2.9 in the spring.

Book reading in preschool classrooms provides an appealing and flexible foundation for teaching a wide range of language and literacy skills to children. Teachers can use a book-reading session to explain new vocabulary words, teach concepts of print, expose children to the sounds and rhythms of language, and encourage children to express their thoughts and comprehend oral expression. These features of a good-quality book-reading session are all measured by items in the Book-Reading Practices subscale of the TBRS. The average Book-Reading score for ERF classrooms was 2.3 in the fall and 2.4 in the spring out of a possible 4.

To better understand how classrooms performed with respect to the activities associated with book reading, see Table 5.12, which shows average scores for several items that compose the Book-Reading scale.[57]

Table 5.12. Book reading and associated activities in ERF classrooms, fall and spring

| Book-Reading Activity | Mean (SD) | |
| --- | --- | --- |
| | Fall | Spring |
| Number of books read during the observation | 1.65 (1.09) | 1.45 (1.00) |
| Number of book features discussed (title, author, illustrator, cover) | 2.06 (1.01) | 2.38 (1.11) |
| Frequency of introducing and discussing vocabulary words before and during book reading | 2.12 (1.15) | 2.32 (1.17) |
| Quality of teacher's use of facial expressions and voice to capture children's attention | 2.77 (1.37) | 2.79 (1.09) |
| Quantity and quality of open-ended questions asked to encourage discussion of book | 2.59 (1.26) | 2.55 (1.23) |
| Quantity and quality of activities or discussions that extend book reading | 2.12 (1.22) | 1.78 (1.27) |
| Sample Size | 78 | 78 |

SOURCE: Fall and spring classroom observations.

ERF teachers typically read one or more books during the 3-hour observation period. Teachers typically drew children's attention to and discussed two features of the book during book reading—for example, the title, author, or illustrator. Teachers did not consistently use the book-reading session as a springboard for vocabulary or to ask open-ended questions. ERF teachers scored an average of 2.32 on frequency of vocabulary words in the spring, corresponding to "rarely" or "sometimes" introducing new words. Results were similar for the item measuring the frequency of open-ended questions and the extent to which children were permitted time to express their ideas in response. Teachers in ERF classrooms consistently used facial expressions and voice to capture children's attention during book reading. The average score of 2.79 in the spring corresponds to "medium high" quality of this aspect of the book-reading session. Finally, the score for frequency and quality of activities and discussions to extend the book reading (1.78) is in the low- to medium-range, meaning that teachers typically offered at least one activity or discussion to extend the book reading, but the average quality of the extension was low to medium.[58]

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[57] Appendix C contains additional information on the Book-Reading scale and the other subscales that comprise the TBRS.
[58] The correlation between quality and quantity of the book-reading extensions items is .94; therefore, the combined quantity and quality score closely reflects the individual scores.

Phonological-awareness activities provide opportunities for children to learn word and letter sounds, which are fundamental skills needed for reading. The TBRS provides indicators of whether the teacher introduced or discussed any of seven phonological awareness activities: listening (to sounds generally or to sounds in spoken words), rhyming, alliteration, sentence segmenting (clap for each word in a sentence or rearrange word cards), onset-rime blending and segmenting (teaching initial consonant sounds by using simple rhyming words as in "bat" and "cat"), syllable blending or segmenting (calling attention to each syllable in a word), and phoneme blending, segmenting, and manipulation (calling attention to each separate sound in a word). Table 5.13 shows the proportion of classrooms in the fall and spring in which each phonological awareness activity was observed.

Table 5.13. Phonological awareness activities in ERF classrooms fall and spring

| | Observation time | |
|---|---|---|
| Phonological Awareness Activity | Fall | Spring |
| Activity observed: | % of classrooms where activity observed | |
| Rhyming (identifying words with the same ending sound) | 47.4 | 64.1 |
| Listening (teacher draws attention to environmental sounds) | 52.6 | 39.7 |
| Alliteration (note initial sounds in words (e.g. lazy lizard lounging)) | 43.6 | 32.1 |
| Onset-rime blending and segmenting (working with words that share sounds and varying the first letter or sound—c-at, b-at) | 25.6 | 26.9 |
| Phoneme blending, segmenting and manipulation (isolate sounds in words and replace with other sounds) | 25.6 | 26.9 |
| Sentence segmenting (clapping for each word in a sentence, deleting words in a sentence, using word cards) | 25.6 | 12.8 |
| Syllable blending and segmenting (clapping for each syllable, deleting syllables) | 16.7 | 21.8 |
| Average number of different activities observed | 2.4 | 2.2 |
| Sample Size | 78 | 78 |

SOURCE: Fall and spring classroom observations.

Rhyming was the most common activity in the spring, and was observed in 64 percent of the classrooms. Listening and alliteration activities were observed in 40 percent and 32 percent of classrooms in the spring, respectively. Other more challenging phonological-awareness activities, such as blending and segmenting words, syllables, initial sounds, and phonemes, were observed in 27 percent or fewer ERF classrooms. We observed an average of 2.2 different phonological-awareness activities during the spring visit to ERF classrooms.

The quality of the phonological awareness activities is measured by the degree to which children seem engaged in the activity. The average score for quantity and quality of Phonological Awareness Activities combines the number of different activities observed, the number of different classroom contexts where those activities were observed, and the level of children's engagement in the activity. ERF classrooms had similar scores on this subscale in the fall (2.2) and spring (2.0).

Knowledge of print and letters is another skill needed for reading. The TBRS Print and Letter Knowledge subscale taps the frequency and level of children's engagement in print and letter-learning opportunities, which include instances when the teacher discusses concepts about print; associates letters with their picture, name, shape, and sound; and talks about contrasting sounds and meanings of words, rhyming words, and uppercase and lowercase letters. This subscale also measures the classroom print environment, which includes theme- and topic-related books available in the classroom, charts, posters, and labels on materials in activity centers and around the classroom, and a complete letter wall, showing pictures with printed words for each letter of the alphabet (to support teaching the names and sounds of letters). The average score for Print and Letter Knowledge in the spring was 2.1 for ERF classrooms (reflecting some observed learning opportunities at medium quality, on average).

Providing children with opportunities for writing and showing them how to write letters can help children's letter-recognition skills and help them to understand that writing and reading are complementary literacy activities. The Written Expression subscale measures the extent to which teachers provide learning opportunities that model writing and provide materials for writing in the classroom. ERF classrooms scored an average of 2.3 on this subscale in the spring, reflecting that some learning opportunities and materials of average quality and variety were observed during the visit.

ERF requires programs to assess children's progress in language development and literacy skills so that instruction can build more effectively on what children have learned and help them progress to the next level. TBRS subscales, Child Portfolios and Dynamic Assessment, measure the extensiveness, completeness, and recency of progress assessments and samples of children's work. ERF classrooms scored an average of 2.8 in the spring on the Portfolios subscale, meaning that over half of children's portfolios contained at least one work sample and an anecdotal teacher note. On Dynamic Assessment, ERF classrooms scored an average of 2.8 in the spring. Fewer than half of the classrooms had recent (within 30 days) documentation of children's developmental progress across a range of emergent literacy areas, while more than half of the teachers said that they plan for instruction on the basis of children's assessments and could identify an average of two ways in which they use results from child assessments.

The total TBRS score summarizes all of the TBRS general quality and language, literacy, and assessment subscales described in this chapter and reported in Tables 5.10 and 5.11. The average TBRS total score was 2.7 in the fall and 2.6 in the spring (see Table 5.10).

# Chapter 6. Impacts on Teachers and Classroom Practices

The Early Reading First (ERF) program provides funding to preschools to improve classroom environments and teacher practices particularly to help economically disadvantaged preschool children develop language and early literacy skills. To support development of these skills, ERF grantees are required to use the funds to provide:

- Professional development (according to scientifically based reading research) for teachers to enhance children's specific language, cognitive, and early reading skills.

- A high-quality oral-language and literature-rich classroom environment.

- Learning activities and instructional materials designed according to scientifically based reading research that cover oral language, phonological awareness, print awareness, and alphabetic knowledge.

- Assessments and other appropriate measures developed according to scientifically based reading research to determine reading skills that children are learning.

- Integration of the materials, activities, tools, and measures into the preschool's existing programs.

In this chapter, we analyze the program's impacts on teachers' professional development and classroom-learning environments. ERF funding for the 2003 cohort of grantees was awarded in October 2003, and programs were expected to train teachers and purchase materials in the fall of 2003 so that ERF would be fully implemented in classrooms by January 2004. Accordingly, we examined the impacts of ERF in both fall 2004 and spring 2005 because both time points were expected to reflect full implementation of ERF. However, to avoid repetition, we present only the spring impacts in this chapter. Fall impacts are presented in Appendix D. We obtained impact estimates by using the methods discussed in Chapter 2 and Appendix A.[59] Impacts for selected subgroups are presented in Appendix F. The analysis methods accounted for the fact that some outcome domains contained multiple measures. The tables presented include checkmarks for domains in which impacts are jointly statistically significant once the adjustment for multiple comparisons is made. The tables also include p-values for tests of statistical significance of individual outcomes that do not reflect adjustments for multiple comparisons. The conclusions are unaffected when adjustments for multiple comparisons are applied. (see Appendix A for further details on adjustments for multiple comparisons.)

We find that ERF had positive impacts on teachers' professional development in the spring. We also find statistically significant impacts on several domains of classroom quality and the language, early literacy, and assessment practices.

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[59] Appendix A demonstrates that the results are robust to a variety of functional forms. In Appendix A, plots of the data provide graphical evidence of the impacts and the proper functional form of the models.

## Outcome Measures

ERF funds were intended to give teachers the knowledge, skills, and materials necessary to support a literature-rich classroom environment and age-appropriate activities through which preschool children can learn language and early literacy skills. Teacher knowledge and skills are likely to be imparted primarily through professional development but can also be acquired through formal education and teaching experience.

We focus on the following aspects of the classroom environment that can potentially contribute to children's learning:

- general quality of the preschool environment
- language, early literacy, and assessment practices

The general quality measures, including teacher behaviors and aspects of the classroom environment, have been found by previous research to be positively correlated with young children's cognitive skills and emotional development (Vandell and Wolfe 2000; NICHD Early Childhood Research Network 2002, 2003, and 2006). However, given its correlational nature, this research is not conclusive.

The language, early literacy, and assessment practices in the classroom include aspects of teacher-instructional practices and the classroom environment that relate closely to the requirements of ERF. ERF specifies that grantees must provide the types of materials and learning opportunities that can support the development of children's language and early literacy skills. Grantees also should conduct regular progress assessments to gauge children's learning.

Accordingly, we examined the impacts of ERF on

- teacher knowledge and skills
- the general quality of the preschool environment
- the quality of language, early literacy, and child-assessment practices and environments

Within each of these areas, we examined measures within several domains. Table 6.1 summarizes the outcomes, domains, and measures developed for this study; we describe the domains, measures, and our hypotheses in the following text.

Table 6.1. Domains and measures for the analysis of ERF impacts on teachers and classrooms

| Outcome | Domain | Measure |
|---|---|---|
| Teacher knowledge and skills | Teaching experience | Years experience as a preschool teacher |
| | | Years experience teaching at this center or preschool |
| | Hours of professional development | Hours in the past year focusing on teaching language and literacy |
| | | Hours in the past year focusing on curriculum |
| | Mode of professional development | Mode of training: mentoring |
| | | Mode of training: workshops |
| | | Mode of training: mentoring |
| | | Mode of training: workshops |
| | Earnings | Hourly earnings |
| General quality of the preschool classroom | Quality of teacher-child interactions | Teaching and interactions (ECERS-R) |
| | | Teacher sensitivity (TBRS) |
| | | Quality of team teaching (TBRS) |
| | Organization of the environment | Classroom community (TBRS) |
| | | Quality and organization of activity centers (TBRS) |
| | Planning | Lesson planning (TBRS) |
| | Adequacy of supervision | Child-staff ratio |
| Quality of language, early literacy, and assessment practices and environments | Oral language environment | Oral language use by lead teacher (TBRS) |
| | | Oral language use by assistant teacher (TBRS) |
| | Book reading | Number of book-reading sessions (TBRS) |
| | | Book-reading practices (TBRS) |
| | Phonological awareness activities | Number of different phonological awareness activities observed (TBRS) |
| | | Quality of phonological awareness activities (TBRS) |
| | Print and letter knowledge | Learning opportunities (TBRS) |
| | | Classroom print environment (TBRS) |
| | Written expression | Learning opportunities (TBRS) |
| | | Opportunities and materials for writing (TBRS) |
| | Child screening and progress assessment | Child portfolios (TBRS) |
| | | Dynamic assessment (TBRS) |

ECERS-R = Early Childhood Environment Rating Scale—Revised (Harms, Clifford, and Cryer 1998).
TBRS = Teacher Behavior Rating Scale (Landry et al. 2004).

Teacher knowledge and skills were measured indirectly through teaching experience and professional development (hours and modes of training), which contribute to knowledge and skills. Exhibit 6.1 describes these measures.

Exhibit 6.1. Domains and measures of teacher experience and professional development

**Teaching experience**

*Years teaching preschool*—Teachers' reports of the number of years they have taught in any preschool, at the assistant- or head-teacher level.

*Years teaching at this school*—Teachers' reports of the number of years they have taught in their current center or school, at the assistant- or head-teacher level.

**Professional development**

*Professional development hours*—Teachers' reports of the number of hours of professional development received in the past 12 months. Teachers reported about training received in two different contexts, which are not mutually exclusive:

> *Professional development on language and literacy topics*—Teachers' reports of the number of hours and modes of training used to learn about any language or early literacy topic in the previous 12 months.

> *Professional development on curriculum*—Teachers' reports of the number of hours and modes of training used to learn about a particular curriculum. If teachers were trained to use a curriculum focusing on language and early literacy skills, the hours and modes of training reported for this activity might be reported both as training on curriculum and as training on language and literacy topics.

*Professional development modes of training*—Teachers' indications of whether the training they received was through mentoring or workshops.

> *Mentoring or tutoring*—Intensive, one-on-one training that entails an experienced or master teacher observing the mentored teacher at work in her classroom and then meeting with her later to discuss strengths and weaknesses of her practice and to suggest strategies for improvement.

> *Workshops*—Group instruction on a particular topic in a conference or adult classroom setting.

**Earnings**

*Hourly earnings*—Directors' reports of the hourly earnings of one teacher in their preschool whose classroom was observed.

We expected that ERF preschools would enhance teachers' knowledge and skills through professional development. Professional development may focus either on techniques for helping children develop language and literacy skills or on curricula designed for these purposes. ERF encouraged grantees to use intensive modes of professional development, particularly mentoring or tutoring. In addition to examining mentoring, we also measured the use of workshops for professional development. Because of their relatively low cost, workshops may be equally available to teachers in the funded and unfunded groups. Finally, higher teacher earnings can help to reduce turnover that might occur after teachers have improved their skills by receiving more training. Accordingly, we examined whether ERF increased teachers' earnings.

We examined several aspects of the general quality of the preschool environment; specific measures used in this study are described in Exhibit 6.2.

Exhibit 6.2. Measures of general quality of the preschool classroom

***Early Childhood Environment Rating Scale—Revised (ECERS-R; Harms, Clifford, and Cryer 1998)***—This scale is used widely to measure the quality of the classroom environment for children ages 2.5 through 5 years. Items measure the quality of space, materials, and teacher interactions with children, the range and quality of activities, and program support for parents and staff. The full scale includes 43 items, each scored from 1 (inadequate) to 7 (excellent). The ERF evaluation used a subscale of the ECERS-R:

> ***Teaching and Interactions (Clifford et al. 2005)***—This 11-item subscale was created on the basis of a factor analysis of the ECERS-R in 240 pre-kindergarten classrooms sampled from 6 states (Clifford et al. 2005). The items include those measuring the emotional and educational quality of teacher-child interactions and the encouragement of language development during the preschool day. Items are scored higher if the teacher models language or encourages the child to use language in the context of the activity.
>
> *For example, the Discipline item is scored 1 if discipline is severe, lax, or reflects inappropriate expectations; 3 if staff maintain basic control, do not use severe methods, and have generally appropriate expectations; 5 if staff use positive discipline methods (attention to positive behavior and redirection), set up the environment to promote positive interactions, and use consistent methods; and 7 if staff work with children to actively solve conflicts through discussion in conflict situations and through storybooks and if they consult professionals about behavior problems.*

***Teacher Behavior Rating Scale (TBRS; Landry et al. 2004)***—This scale is a research measure of the general quality and early literacy and language qualities of preschool classrooms. Originally developed as an implementation-fidelity tool linked to CIRCLE's preschool-literacy curriculum (Landry et al. 2006), the TBRS has been revised and refined for use in the Preschool Curriculum Evaluation Research (PCER) and ERF evaluations. Most items have a quantity aspect (rated 1 to 4, based on frequency) and a quality aspect (rated 0 if not observed or 1 to 4, based on low to high quality). Subscale scores are computed by first averaging, for each item, the quantity and quality scores and then averaging across these mean items. (See Appendix C for details.) Five subscales relate to the general quality of classrooms and teacher practices:

> ***Teacher Sensitivity***—The teacher offers encouragement and positive feedback; is sensitive and responsive to children's cues; provides positive guidance and encourages children to regulate behavior; and uses varied and playful techniques to engage children in literacy, language, and math activities. (4 items; same as Teacher Sensitivity)
>
> ***Quality of Team Teaching***—The teaching assistant improves the teaching environment by working with small groups of children, helping maintain classroom regulation, responding to children, engaging children, and scaffolding children's language. (5 items; same as Team Teaching)
>
> ***Classroom Community***—The classroom is arranged to encourage safe movement, positive interactions, and child independence; children's work is displayed; and rules and routines are established with children's input. (5 items; same as Classroom Community)
>
> ***Quality and Organization of Activity Centers***—Activity centers cover critical learning objectives and are linked to theme. Materials are refreshed and rotated; centers have clear boundaries, and children understand how to move between centers and use materials appropriately. Centers provide space that encourages interaction; table arrangement supports activities linked with centers. (7 items; same as Quality and Organization of Activity Centers)
>
> ***Lesson Planning***—Written lesson plans have strong thematic connections, and lessons are implemented through observed activities and materials located throughout the room. (3 items; same as Lesson Plans)

***TBRS Total Score***—The total TBRS score is the average score across all subscale scores.

***Child-Staff Ratio***—The child-staff ratio is the ratio of the observed number of children in the room to the observed number of paid staff.

The general quality of the preschool classroom environment provides a foundation for teaching and learning. We examined the impacts of ERF on these aspects of the environment because preschools may focus on these areas in order to support the language and literacy activities that are central to ERF.

The quality of language, early literacy, and child-assessment practices and environments is a major focus of ERF, and we have developed several measures for this study, based on the TBRS. The measures examine teacher instructional practices and the materials available in the classroom environment (see Exhibit 6.3); the measures are scaled so that higher values represent greater frequency or quality or both. Most TBRS items measure both the frequency and the quality of a teacher activity or classroom feature, but these ratings are highly correlated (see Appendix C for details about the TBRS and the measures used in this chapter).

Exhibit 6.3. Measures of language, early literacy, and assessment practices in preschool classrooms

***Teacher Behavior Rating Scale (TBRS; Landry et al. 2004)***—This scale is a research measure of the general quality and early literacy and language qualities of preschool classrooms. Originally developed as an implementation fidelity tool linked to CIRCLE's preschool literacy curriculum (Landry et al. 2006), the TBRS has been revised and refined for use in the Preschool Curriculum Evaluation Research (PCER) and ERF evaluations. Most items have a quantity aspect (rated 1 to 4 based on frequency) and a quality aspect (rated 0 if not observed or 1 to 4 based on low to high quality). Subscale scores are computed by first averaging, for each item, the quantity and quality scores and then averaging across these mean items. (See Appendix C for original TBRS measures and ERF adaptations.) The following 12 outcome measures relate to the language and literacy environment of classrooms and teacher practices in these areas and in tracking children's progress:

*Oral language use by lead teacher*—The teacher models language, speaks clearly and grammatically, uses rich labels, descriptors, and verbs, uses open-ended "thinking" questions, relates previously learned words and concepts to activity, encourages children's use of language, and engages children in turn-taking conversations. (7 items; same as Oral Language Use with Students in original TBRS)

*Oral language use by assistant teacher*—The assistant teacher uses rich labels, descriptors, and verbs; asks open-ended questions; and encourages conversations in small-group work as she moves around the classroom. (2 items out of 5 from the Team Teaching Ability subscale in original TBRS)

*Number of book-reading sessions observed*—Observations note the number of times the teacher reads a book to children, either in large or small groups, during the two-hour observation period. (1 descriptive observation item coded in conjunction with (but not part of) the Book-Reading Behaviors subscale in original TBRS)

*Book-reading practices*—Teacher and children discuss features of the book (for example, the title and illustrator); teacher discusses vocabulary words and uses pictures or objects as props for the words before reading; teacher captures attention using facial expression, voice, and modulation; paces reading; and allows children to comment; teacher asks open-ended questions and initiates activities and discussions to extend the book reading. (8 items; same as Book Reading Behaviors subscale in original TBRS)

*Number of different phonological awareness activities observed*—Observations note the number of distinct activities carried out during the two-hour period, including listening, rhyming, alliteration, sentence segmenting, syllable blending and segmenting, onset-rhyme blending and segmenting, phoneme blending, segmenting, and manipulation. (1 item based on count of 7 possible activities from Phonological Awareness Activity in original TBRS)

*Quality of phonological awareness activities*—The level of child engagement is noted in the observed phonological awareness activities. (1 item average of 7 possible observations from Phonological Awareness Activity in original)

*Print and letter knowledge learning opportunities*—The teacher engages children in activities that promote children's knowledge of the names and shapes of letters, the sounds of letters, and concepts about print; score reflects number of such opportunities and children's level of engagement. (3 items out of 6 from Print and Letter Knowledge in original)

*Classroom print environment*—The classroom has a letter wall with letters, pictures, and related activities; activity centers include books and printed words that relate to the center, topic, or theme. (3 items out of 6 from Print and Letter Knowledge in original TBRS)

*Written expression learning opportunities*—The teacher models writing in large or small groups. (1 item out of 3 from Written Expression in original TBRS)

*Opportunities and materials for writing*—The classroom includes many types of materials for children's writing, and writing materials are included in a large number of activity centers. (2 items of 3 from original Written Expression)

*Child portfolios*—A large proportion of children's portfolios contain diverse samples of children's work and recently dated teacher-written observations. (2 items; same as Portfolios in original TBRS)

*Dynamic Assessment*—Portfolios include documentation of assessment across a range of emergent literacy areas within the past 30 days; teachers use assessments to plan instruction and a variety of activities. (3 items; same as Dynamic Assessment in original TBRS)

Outcome measures for the teacher- and classroom-level analyses were obtained from three sources. Teacher characteristics, experience, formal education, and professional development were measured by a *teacher self-administered survey* completed in fall and spring. Hourly earnings for one randomly selected teacher per preschool were reported by the preschool director in the *fall and spring director survey*. Classroom environments and teacher practices in the classroom were measured by trained observers, who completed semistructured *observation protocols during 3-hour classroom visits* in the fall and spring.

## Impacts on Teachers and Classroom Environments

Overall, we find that in the spring, ERF had positive impacts on teachers' professional development. The program increased hours of professional development during the 12 months preceding the survey and the proportion of teachers receiving professional development through mentoring. ERF also had pervasive impacts on the general quality of the preschool classroom; on the classroom language environment, materials, and teaching practices that support early literacy; and on child-assessment practices.

### Impacts on Teachers' Qualifications

One way in which ERF preschools could have improved teacher knowledge and skills was to hire new teachers with higher levels of experience. However, we find no evidence of an impact of ERF on years of teaching experience, measured as either teaching preschool generally or teaching at the current school or center.

ERF had a positive impact on teachers' professional development in spring 2005 (see Table 6.2). The program increased the number of hours of professional development that focused on language and early literacy topics by 50 hours (approximately 6 days) over the 12 months preceding the spring survey. ERF also had a positive impact on the mode of training. A higher proportion of ERF teachers than teachers in unfunded programs reported receiving professional development on language or literacy topics and on curriculum topics through mentoring or tutoring. The estimated impact on the proportion of teachers receiving mentoring or tutoring on language and literacy topics was 41 percentage points. Over half of ERF teachers reported receiving mentoring or tutoring in the previous year on language and literacy topics (56 percent, using regression-adjusted percentages), compared with 15 percent of unfunded teachers. A larger proportion of ERF teachers than teachers in unfunded programs also reported receiving workshop training on language and literacy topics. The estimated impact on the proportion of teachers receiving workshop training on language and literacy topics was 41 percentage points. Seventy-three percent of ERF teachers reported receiving mentoring in the previous year on language and literacy topics (using regression-adjusted percentages), compared with 38 percent of unfunded teachers.

Table 6.2. ERF impacts on teachers' experience, training, and earnings, spring 2005

| Domain/Outcome (range) | Unadjusted means | | Regression-adjusted means | | | | |
| | Funded | Unfunded | Funded | Unfunded | Estimated impact[a] | Effect size[b] | P-value of impact |
|---|---|---|---|---|---|---|---|
| Teaching Experience | | | | | | | |
|   Years at current school or center (0–30) | 5.44 | 6.27 | 6.33 | 4.45 | 1.88 | 0.32 | 0.248 |
|   Years at any preschool (0–36) | 9.34 | 9.37 | 9.93 | 8.37 | 1.56 | 0.21 | 0.405 |
| Professional Development ✓ | | | | | | | |
|   Professional development focusing on early-language and literacy topics: | | | | | | | |
|     Hours (1–160) | 67.77 | 30.27 | 72.03 | 22.09 | 49.94 | 1.04 | 0.002* |
|     Received professional development through: | | | | | | | |
|     Mentoring or tutoring (%) | 60.00 | 15.00 | 55.60 | 14.90 | 40.70 | 0.86 | 0.009* |
|     Workshops (%) | 64.44 | 38.00 | 72.80 | 32.03 | 40.77 | 0.82 | 0.000* |
|   Professional development focusing on curriculum: | | | | | | | |
|     Hours (0–160) | 43.37 | 19.00 | 39.91 | 24.51 | 15.41 | 0.39 | 0.209 |
|     Received professional development through: | | | | | | | |
|     Mentoring or tutoring (%) | 46.67 | 17.00 | 49.32 | 14.25 | 35.07 | 0.78 | 0.027* |
|     Workshops (%) | 56.67 | 40.00 | 53.05 | 46.46 | 6.59 | 0.13 | 0.675 |
| Sample Size | | | | | | | |
| Number of teachers | | | 90 | 100 | | | |
| Number of sites | | | 28 | 37 | | | |
| Earnings | | | | | | | |
|   Teachers' hourly earnings (6.09–54.44) | 20.20 | 17.98 | 20.46 | 17.28 | 3.18 | 0.30 | 0.517 |
| Sample Size | | | | | | | |
| Number of preschools | | | 43 | 45 | | | |
| Number of sites | | | 23 | 30 | | | |

*p-value (of adjusted difference in means) < 0.05; two-tailed test.
✓Impact on domain is positive and statistically significant after adjustments for multiple comparisons (see Appendix A).
[a]All estimates except those for earnings were obtained from a regression model of the outcome variable on an indicator variable of ERF grant receipt; grant application score; and teacher's education, age, and an indicator variable of nonwhite, using SAS's PROC MIXED procedure for continuous outcome measures and SUDAAN logit for binary outcome measures. Missing values of covariates were mean-imputed by site. For earnings, the regression model included only an indicator variable of ERF grant receipt and grant application score without any teacher demographic controls.
[b]The effect size was calculated by dividing the estimated impact by the standard deviation of the outcome measure (that is, the impact expressed as a percentage of the standard deviation).
NOTE: All figures were estimated by using sample weights to account for the sample and survey designs. Standard errors of the impact estimates account for design effects due to unequal weighting of the data and clustering at site level.
SOURCE: ERF spring teacher surveys and director surveys.

We found no statistically significant differences in the hourly earnings of teachers in ERF programs relative to those in unfunded programs in the spring. We conclude that ERF did not induce preschools to raise the wages of their teachers, who had received additional professional development through the program.[60]

**Impacts on General Quality of Preschool Classrooms**

In the spring, ERF had positive impacts on each of the domains of the general quality of preschool classrooms except adequacy of supervision (see Table 6.3). ERF increased the lead teachers' sensitivity and the quality of interactions toward children by approximately one standard deviation relative to what we would have expected in the absence of the program. In addition, team teaching, which measures the extent to which the assistant teacher contributes to the language environment and acts as a team player to extend the lead teacher's activities, was improved by 0.79 standard deviations.

Impacts on the two measures of the organization of the classroom environment—classroom community and the quality and organization of activity centers—exceed one standard deviation. ERF also significantly improved lesson planning.

ERF increased the overall quality of the classroom-learning environment, measured by the total TBRS score (the average across subscales measuring general classroom quality and the language and early literacy environment). In ERF classrooms, the regression-adjusted average total TBRS score was 1.44 standard deviations higher than it would have been in the absence of ERF.

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[60] The teacher hourly earnings data are reported by center directors, not teachers.

Table 6.3. ERF impacts on classroom outcomes: general quality of the preschool classroom, spring 2005

| Domain/Outcome (range) | Unadjusted means | | Regression-adjusted means | | Estimated impact[a] | Effect size[b] | P-value of impact |
|---|---|---|---|---|---|---|---|
| | Funded | Unfunded | Funded | Unfunded | | | |
| Quality of Teacher-Child Interactions ✓ | | | | | | | |
| Teaching and Interactions (ECERS-R) (1.60–7.00) | 5.78 | 5.09 | 5.94 | 4.73 | 1.20 | 1.12 | 0.001* |
| Teacher Sensitivity (TBRS) (0.50-4.00) | 3.07 | 2.69 | 3.16 | 2.49 | 0.67 | 0.99 | 0.008* |
| Quality of Team Teaching (TBRS) (0.80–4.00) | 2.99 | 2.40 | 3.04 | 2.29 | 0.76 | 0.79 | 0.049* |
| Organization of the Environment ✓ | | | | | | | |
| Classroom Community (TBRS) (0.90–4.00) | 3.19 | 2.75 | 3.33 | 2.51 | 0.82 | 1.22 | 0.001* |
| Quality and Organization of Activity Centers (TBRS) (0.86–4.00) | 2.93 | 2.38 | 3.03 | 2.14 | 0.88 | 1.13 | 0.003* |
| Planning | | | | | | | |
| Lesson Planning (TBRS) (0.50–4.00) | 3.05 | 2.41 | 3.13 | 2.27 | 0.87 | 0.84 | 0.016* |
| Total Teacher Behavior Rating Scale | | | | | | | |
| Total TBRS Score (0.94–3.89) | 2.65 | 2.07 | 2.77 | 1.84 | 0.93 | 1.44 | 0.000* |
| Adequacy of Supervision | | | | | | | |
| Child-staff ratio (2.40–20.00) | 7.50 | 7.65 | 7.06 | 8.19 | −1.13 | −0.38 | 0.336 |
| Sample Size | | | | | | | |
| Number of Classrooms | | | 78 | 91 | | | |
| Number of Sites | | | 28 | 37 | | | |

*p-value (of adjusted difference in means) < 0.05; two-tailed test.
✓Impact on domain is positive and statistically significant after adjustments for multiple comparisons (see Appendix A).
[a]All estimates were obtained from a regression model of the outcome variable on an indicator variable of ERF grant receipt; grant application score; and teacher's education, age, and an indicator variable of nonwhite, using SAS's PROC MIXED procedure. Missing values of covariates were mean-imputed by site.
[b]The effect size was calculated by dividing the estimated impact by the standard deviation of the outcome measure (that is, the impact expressed as a percentage of the standard deviation).
NOTE: All figures were estimated by using sample weights to account for the sample and survey designs. Standard errors of the impact estimates account for design effects due to unequal weighting of the data and clustering at site level.
SOURCE: ERF spring classroom observations.

ERF had no statistically significant impact on observed child-staff ratios in the spring. Ratios for both funded and unfunded programs were between 7 and 8 children per staff member, well within professionally accepted upper limits for ratios in preschool classrooms (10 children per adult).

**Impacts on Classroom Support for Language and Early Literacy**

In the spring, ERF had positive impacts on all domains of classroom language, early literacy, and assessment practices (see Table 6.4). The Oral Language Use subscale measures the language environment provided by the lead teacher and the assistant teacher in the classroom. Oral language use by both the lead and assistant teachers in ERF classrooms was rated higher than it would have been in the absence of ERF, by 1.11 standard deviations for lead teachers and by 0.89 standard deviations for assistant teachers.

Book-reading practices, which measures the use of a book-reading session to reinforce concepts of print and encourage children's oral expression, were rated higher in ERF classrooms than they would have been in the absence of ERF by 1.03 standard deviations.  However, ERF did not increase the number of book-reading sessions (the number of times a teacher sat down with children to read one or more books).

Table 6.4. ERF impacts on classroom outcomes: language, early literacy, and assessment practices, spring 2005

| Domain/Outcome (range) | Unadjusted means | | Regression-adjusted means | | | | |
| | Funded | Unfunded | Funded | Unfunded | Estimated impact[a] | Effect size[b] | P-value of impact |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Oral Language Environment ✓ | | | | | | | |
| Oral language use by lead teacher (0.50–4.00) | 2.88 | 2.39 | 3.00 | 2.17 | 0.83 | 1.11 | 0.002* |
| Oral language use by assistant Teacher (0.50–4.00) | 2.67 | 1.90 | 2.77 | 1.73 | 1.04 | 0.89 | 0.027* |
| Book Reading ✓ | | | | | | | |
| Number of book-reading sessions observed (0–4) | 1.45 | 1.16 | 1.41 | 1.20 | 0.21 | 0.23 | 0.516 |
| Book-reading practices (0.56–3.94) | 2.40 | 1.77 | 2.49 | 1.60 | 0.89 | 1.03 | 0.003* |
| Phonological Awareness Activities ✓ | | | | | | | |
| Number of different phonological awareness activities observed (0–7) | 2.24 | 0.96 | 2.40 | 0.67 | 1.73 | 1.10 | 0.004* |
| Quality of phonological awareness activities (0–4.00) | 1.91 | 1.30 | 2.04 | 1.07 | 0.97 | 0.79 | 0.024* |
| Print and Letter Knowledge ✓ | | | | | | | |
| Learning opportunities (0.50–4.00) | 2.04 | 1.29 | 2.05 | 1.20 | 0.85 | 0.87 | 0.022* |
| Classroom print environment (0.50–4.00) | 2.24 | 1.71 | 2.28 | 1.59 | 0.69 | 0.81 | 0.028* |
| Written Expression ✓ | | | | | | | |
| Learning Opportunities (0.50–4.00) | 1.88 | 0.99 | 1.99 | 0.78 | 1.21 | 1.06 | 0.003* |
| Opportunities and materials for writing (0.50–4.00) | 2.34 | 1.72 | 2.55 | 1.32 | 1.23 | 1.48 | 0.000* |
| Child Screening and Progress Assessments ✓ | | | | | | | |
| Child portfolios (1.00–5.00) | 2.82 | 2.09 | 3.07 | 1.72 | 1.35 | 0.98 | 0.012* |
| Dynamic assessment (0.67–4.33) | 2.79 | 2.34 | 2.89 | 2.18 | 0.71 | 0.64 | 0.095 |
| Sample Size | | | | | | | |
| Number of Classrooms | | | 78 | 90 | | | |
| Number of Sites | | | 28 | 37 | | | |

*p-value (of adjusted difference in means) < 0.05; two-tailed test.
✓Impact on domain is positive and statistically significant after adjustments for multiple comparisons (see Appendix A).
[a]All estimates were obtained from a regression model of the outcome variable on an indicator variable of ERF grant receipt; grant application score; and teacher's education, age, and an indicator variable of nonwhite, using SAS's PROC MIXED procedure. Missing values of covariates were mean-imputed by site.
[b]The effect size was calculated by dividing the estimated impact by the standard deviation of the outcome measure (that is, the impact expressed as a percentage of the standard deviation).
NOTE: All figures were estimated by using sample weights to account for the sample and survey designs. Standard errors of the impact estimates account for design effects due to unequal weighting of the data and clustering at site level.
SOURCE: ERF spring classroom observations.

ERF had positive impacts on classroom materials and teacher practices to promote children's letter recognition and the association between sounds and letters (the domains of phonological awareness activities, print and letter knowledge, and written expression). Phonological-awareness activities measured by the TBRS include listening, rhyming, alliteration, sentence segmenting, onset-rime blending and segmenting words), syllable blending or segmenting, and phoneme blending, segmenting, and manipulation. ED guidance on ERF recommends additional phonological awareness activities beyond traditional nursery school rhymes. We expect that ERF teachers will look for more opportunities to introduce phonological awareness activities in class. We found that the number of different phonological awareness activities observed during the 3-hour observation period was higher in ERF classrooms than in unfunded classrooms by 1.73 (or nearly 2) activities, on average. (Appendix D provides details about the percentage of classrooms in which each type of phonological awareness activity was observed.) The quality of these activities, measured by the level of children's engagement, was also significantly higher in ERF classrooms than it would have been in the absence of ERF.

ERF had a positive impact on the classroom print environment (labels, books, and letters displayed with pictures) and the opportunities and materials for writing. Regression-adjusted average scores for the classroom print environment subscale were 0.81 standard deviations higher in ERF classrooms than in unfunded classrooms, and scores for opportunities and materials for writing in ERF classrooms were 1.48 standard deviations higher. ERF also had a positive impact on teacher practices in these areas. Print- and letter-knowledge learning opportunities tap both the frequency that teachers provide lessons or explanations about print and letters and the level of children's engagement in them. The impact of ERF on print- and letter-knowledge learning opportunities is 0.87 standard deviations, and the impact on written-expression learning opportunities (modeling writing) is 1.06 standard deviations.

ERF requires teachers to periodically assess children's language development and literacy skills as a basis for building lessons on what children know, but it does not require teachers to use portfolios. ERF had positive impacts on child screening and progress assessment in the spring. ERF improved the extensiveness and completeness of children's portfolios, although it did not have statistically significant impacts on dynamic assessment.

# Chapter 7. Impact Findings: ERF Impacts on Children's Language and Literacy Skills and Social-Emotional Outcomes

Ultimately, through its effects on classroom practices, the ERF Program is intended to provide young children with the necessary language, cognitive, and early reading skills to prevent reading difficulties and ensure school success as they enter kindergarten. In this chapter, we examine whether ERF achieved this goal, through our analysis of the program's impacts on three domains of children's language and early literacy skills: print and letter knowledge, phonological awareness, and oral language. In addition, we examine the program's effects in the *nonliteracy* domain of social-emotional development, in response to concerns that ERF might have had detrimental effects in this domain if it led teachers to focus on improving early literacy skills at the exclusion of other areas of child development. The analytic methods underlying this analysis are discussed in Appendix A.[61] The analysis methods accounted for the fact that some outcome domains contained multiple measures. The tables presented include checkmarks for domains in which impacts are jointly statistically significant once the adjustment for multiple comparisons is made. The tables also include p-values for tests of statistical significance of individual outcomes that do not reflect adjustments for multiple comparisons. The conclusions are unaffected when adjustments for multiple comparisons are applied (see Appendix A for further details on adjustments for multiple comparisons).

We find that the program had a statistically significant positive effect on children's print and letter knowledge. However, we find no statistically significant impacts on either phonological awareness or oral language. We also find no evidence that the program had detrimental effects on any of the nonliteracy outcomes examined.

## Outcome Measures

The outcome measures for the child-level analyses were obtained from assessments that were given to children in spring of the school year on their literacy and language skills and behavior.

We examined ERF impacts on children's literacy and language skills in three domains. To measure *print and letter knowledge,* we used the Print Awareness subtest of the Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP, Lonigan et al. 2002). To measure *phonological awareness,* we used the Elision subtest of the Pre-CTOPPP (Lonigan et al. 2002). To measure *oral language,* we used two separate assessments: the Expressive One-Word Picture Vocabulary Test (EOWPVT, Brownell 2000) and the Auditory Comprehension subtest of the Preschool Language Scale, Fourth Edition (PLS-4, Zimmerman et al. 2002). Higher values for each measure are associated with higher literacy and language skills. Exhibit 7.1 describes these measures and provides sample items.

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[61] Appendix A demonstrates that the results are robust to a variety of functional forms. In Appendix A, plots of the data provide graphical evidence of the impacts and the proper functional form of the models.

We also estimated ERF's impacts on children's social-emotional development, as measured by three subscales of the 30-item Social Competence and Behavior Evaluation (SCBE); see Exhibit 7.2. This evaluation is based on assessments of the child by the child's teacher. The three 10-item subscales include a social-competence subscale, an anger-aggression subscale, and an anxiety-withdrawal subscale. Higher values on the social-competence subscale represent a positive outcome (the child is more socially competent) while higher values on the anger-aggression and anxiety-withdrawal subscales indicate negative outcomes (the child is more angry-aggressive or anxious-withdrawn).

Exhibit 7.1. Domains of language and early literacy skills and associated measures

**Print and Letter Knowledge**—measured by the ***Print Awareness*** subtest of the Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP; Lonigan, et al., 2002).

The Pre-CTOPPP includes subtests that measure print concepts, letter and word discrimination, letter identification, phonological sensitivity (sound and word blending and elision), and vocabulary for children ages 3 to 6 years. Children are directly assessed by using a standard protocol. The ERF evaluation used a research version of the test available in 2004; however, the slightly revised test with normed scores has been published by ProEd as the Test of Preschool Early Literacy (TOPEL). The TOPEL norms can be used to derive age-adjusted, standardized scores for the Pre-CTOPPP Print Awareness subtest. The Print Awareness normed scores have a mean of 100 and a standard deviation of 15; see Appendix C for more information on how these standard scores were constructed.

The Print Awareness subtest measures print concepts, letter and word discrimination, letter identification, and letter-sound recognition.

> *For example, the child is asked to point to the title of the book; distinguish letters from numbers; distinguish words from numbers and pictures; identify printed letters; associate letters with sounds; provide the name of particular letters; and provide the sound of particular letters.*

**Phonological Awareness**—measured by the ***Elision*** subtest of the Pre-CTOPPP (see above). Because of differences in the Pre-CTOPPP and the TOPEL, norms cannot be used to derive scores for the Elision subtest, so only raw scores are presented for this measure.

The Elision subtest measures the child's ability to isolate and drop a syllable or phoneme from a word, which is one component of phonological awareness.

> *For example, the child is asked to say a compound word and drop one part ("toothbrush" without "brush"); say a two-syllable word and drop one part ("candy" without "dee"); and say a one-syllable word and drop one phoneme ("heat" without "t") both with and without multiple-choice picture prompts.*

**Oral Language**—measured by (1) the ***Expressive Vocabulary*** subtest of the Expressive One-Word Picture Vocabulary Test, Third Edition (EOWPVT-III; Brownell 2000) and (2) the ***Auditory Comprehension*** subtest of the Preschool Language Scale, Fourth Edition (PLS-IV; Zimmerman, et al., 2002).

(1) The EOWPVT-III measures English-speaking vocabulary of children ages 24 months to 18 years, 11 months. Children are directly assessed by using a standard protocol. The EOWPVT-III was normed on a nationally representative sample of children of various ages so that raw scores can be converted to age-adjusted, standardized scores with a mean of 100 and a standard deviation of 15.

The Expressive Vocabulary subtest is designed to assess expressive vocabulary and word retrieval.

> *The child is presented with pictures and is asked to name the objects, actions, and concepts shown in the pictures. Children are asked to name pictures showing a personal computer, a wagon, and a teacup; they are shown a picture of a painter and asked, "What is he doing?" and they are shown a picture of a cow, a bear, a giraffe, and a turkey and asked, "What word names all of these?"*

(2) The PLS-IV measures language development of children from birth through 6 years, 11 months. The PLS includes two subtests, Auditory Comprehension and Expressive Communication. Each subtest was normed on a nationally representative sample of children of various ages so that raw scores can be converted to age-adjusted, standardized scores with a mean of 100 and a standard deviation of 15. Children are directly assessed by using a standard protocol.

The Auditory Comprehension subtest measures comprehension of basic vocabulary, concepts, and grammatical markers such as comparatives and superlatives. Test items ask children to identify a named color, identify categories of objects, understand "more" and "most," understand expanded sentences, qualitative concepts, and time concepts, understand the –er ending as one who . . ., and identify objects that do not belong to a group.

> *For example, the child is asked to point to the bear that is blue; complete analogies such as "Ice cream is cold; a fire is ____;" point to the animal with the longest nose; and identify which item does not belong in a set that includes a car, a truck, a boat, and a chair.*

Exhibit 7.2. Measures of social-emotional development

**Social-Emotional Development**—measured by three subscales of the Social Competence and Behavior Evaluation—Short Form (LaFreniere and Dumas 1996), which measures the child's affect and behavior in relationships with teachers and peers. Teachers rate the child's "typical behavior or emotional state" on 30 items, each scored from 0 (never occurs) to 5 (always occurs). Three subscales were formed from these items:

*Social Competence*—measures the extent to which the child exhibits cooperative behavior and interacts well in relation to other children. For example, the measure asks about "takes other children and their point of view into account," "comforts or assists another child in difficulty," and "takes pleasure in own accomplishments." The subscale includes 10 items, and the score is the sum of the items.

*Anxiety-Withdrawal*—measures the extent to which the child tends to withdraw from groups of children or to exhibit sad or anxious behavior. For example, the measure asks about "worries," "doesn't talk or interact in a group," and "sad, unhappy." The subscale includes 10 items, and the score is the sum of the items.

*Anger-Aggression*—measures the extent to which the child exhibits angry, oppositional, or destructive behavior or tends to be in conflict with others. For example, the measure asks about "screams or yells easily," "hits you or destroys things when angry with you," and "opposes your suggestions." The subscale includes 10 items, and the score is the sum of the items.

## Impacts on Child Outcomes

ERF had a statistically significant positive effect on print and letter knowledge (see Table 7.1). The program increased children's Pre-CTOPPP print awareness standard scores by 5.78 points (p-value = 0.042) relative to what we would have expected in the absence of the program. This increase indicates that ERF improved children's ability to recognize letters of the alphabet and associate letters with their sounds. The impact estimate translates into an effect size of 0.34 standard deviations. Results are similar for print awareness raw scores. Comparison of the regression-adjusted standard scores for children in the unfunded sites to the national norms for this subtest indicates that in the absence of ERF, children in the ERF sites would have scored about 3 percentage points below the national average of 100; with exposure to ERF, their average score of 102.69 was slightly above the national average for this subtest.

Table 7.1. ERF impacts on child outcomes in spring, preferred model, without controls for fall value of outcome measure

| Outcome (range) | Unadjusted means | | Regression-adjusted means | | Estimated impact[a] | Effect size[b] | P-value of impact |
|---|---|---|---|---|---|---|---|
| | Funded | Unfunded | Funded | Unfunded | | | |
| Language and Literacy Skills | | | | | | | |
| **Print and Letter Knowledge✓** | | | | | | | |
| Print awareness, raw score (0–36) | 22.73 | 20.10 | 23.51 | 19.11 | 4.40 | 0.44 | 0.027* |
| Print awareness, standard score (58–144) | 101.39 | 98.92 | 102.69 | 96.91 | 5.78 | 0.34 | 0.042* |
| **Phonological Awareness** | | | | | | | |
| Elision, raw score (0–18) | 9.18 | 9.20 | 9.40 | 8.99 | 0.41 | 0.10 | 0.441 |
| **Oral Language** | | | | | | | |
| Expressive vocabulary, raw score (0–99) | 38.74 | 39.56 | 39.42 | 39.33 | 0.09 | 0.01 | 0.965 |
| Expressive vocabulary, standard score (53–147) | 82.98 | 83.91 | 83.90 | 83.43 | 0.47 | 0.03 | 0.841 |
| Auditory comprehension, raw score (1–62) | 51.64 | 51.33 | 52.38 | 50.36 | 2.01 | 0.27 | 0.095 |
| Auditory comprehension, standard score (50–135) | 92.59 | 91.70 | 94.11 | 89.82 | 4.29 | 0.28 | 0.088 |
| Number of students | 802 | 846 | | | | | |
| Number of sites | 28 | 37 | | | | | |
| Social Competence and Behavior Evaluation (Scales range from 0 to 50) | | | | | | | |
| Social competence | 31.46 | 32.23 | 32.16 | 31.24 | 0.93 | 0.10 | 0.617 |
| Anxiety-withdrawal | 10.73 | 10.76 | 10.80 | 10.81 | -0.01 | -0.00 | 0.992 |
| Anger-aggression | 9.03 | 9.83 | 8.49 | 10.73 | -2.25 | -0.26 | 0.128 |
| Number of students | 801 | 844 | | | | | |
| Number of sites | 28 | 37 | | | | | |

*p-value (of adjusted difference in means) < 0.05, two-tailed test.
[a]All estimates were obtained from a regression model of the outcome variable on an indicator variable of ERF grant receipt; grant application score; and indicator variables of female and nonwhite, using SAS's PROC MIXED procedure. Language and literacy skill models also control for indicator variables of fall assessment taken in Spanish, missing fall assessment data, and age at spring assessment. SCBE models also control for an indicator variable of missing fall SCBE data and age at spring SCBE observation. Missing values of covariates are mean-imputed by site and gender.
[b]The effect size was calculated by dividing the estimated impact by the standard deviation of the outcome measure (that is, the impact expressed as a percentage of the standard deviation).
✓Impact on domain is positive and statistically significant after adjustments for multiple comparisons (see Appendix A).
NOTE: All figures were estimated by using sample weights to account for the sample and survey designs. Standard errors of the impact estimates account for design effects due to unequal weighting of the data and clustering at site and classroom level.
SOURCE: ERF spring child assessments and SCBE evaluations.

We find no evidence that ERF improved children's phonological awareness (see Table 7.1). The estimated impact on Elision scores is small and not statistically significant at conventional levels. The estimate is similar in a model that included the pretest as a covariate (see Table 7.2).

Similarly, we find no evidence that ERF improved children's oral language skills. ERF's impact on the first measure in this domain—the expressive vocabulary subtest—is small and not statistically significant at conventional levels (see Table 7.1). Results are similar in a model that included the pretest as a covariate (see Table 7.2). ERF's estimated impact was an increase of 4.29 points in the standard score on the second measure in the oral language domain—the auditory comprehension subtest—not statistically significant at the 5 percent level (see Table 7.1). Also, tests that adjust for the multiple outcomes in the oral-language domain indicate that there is no statistically significant impact on children's skills in this domain (see Appendix A).

ERF did not affect children's social-emotional skills, as measured by the SCBE-30 anger-aggression, social-competence, and anxiety-withdrawal scales (see Tables 7.1 and 7.2). The estimated impact on children's social competence is positive but not statistically significant. The estimated impact on anxiety-withdrawal is close to zero and not statistically significant. The estimated impact on anger-aggression is negative and points to a reduction in anger-aggression due to ERF. However, this estimate is also not statistically significant. The lack of program effects in this domain is noteworthy in light of concerns that ERF might *adversely* impact these skills by compelling teachers to focus on improving language and literacy at the expense of developing other skills; our null estimates for these outcomes suggest that ERF did not adversely affect children's nonliteracy skills.

ERF thus appears to have had a positive effect on children's print and letter knowledge but not on phonological awareness or oral language. In addition, ERF neither enhanced nor diminished children's social-emotional development during the preschool year.

Table 7.2. ERF impacts on child outcomes in spring, preferred model, with controls for fall value of outcome measure

| Outcome (range) | Funded | Unfunded | Estimated impact[a] | Effect size[b] | P-value of impact |
|---|---|---|---|---|---|
| Language and Literacy Skills | | | | | |
| **Print and Letter Knowledge** | | | | | |
| Print awareness, raw score (0–36) | — | — | — | — | — |
| Print awareness, standard score (58–144) | — | — | — | — | — |
| **Phonological Awareness** | | | | | |
| Elision, raw score (0–18) | 9.50 | 8.89 | 0.61 | 0.14 | 0.236 |
| **Oral Language** | | | | | |
| Expressive vocabulary, raw score (0–99) | 39.78 | 39.17 | 0.62 | 0.04 | 0.659 |
| Expressive vocabulary, standard score (53–147) | 83.98 | 83.44 | 0.54 | 0.03 | 0.727 |
| Auditory comprehension, raw score (1–62) | — | — | — | — | — |
| Auditory comprehension, standard score (50–135) | — | — | — | — | — |
| Number of students | 802 | 846 | | | |
| Number of sites | 28 | 37 | | | |
| Social Competence and Behavior Evaluation (Scales range from 0 to 50) | | | | | |
| Social competence | 32.28 | 31.56 | 0.72 | 0.08 | 0.591 |
| Anxiety-withdrawal | 11.00 | 10.42 | 0.58 | 0.09 | 0.569 |
| Anger-aggression | 9.03 | 10.15 | −1.12 | −0.13 | 0.249 |
| Number of students | 801 | 844 | | | |
| Number of sites | 28 | 37 | | | |

*p-value (of adjusted difference in means) < 0.05, two-tailed test.

— Not available. Impact estimates controlling for fall values of outcome measures are not presented for these outcomes, because of evidence of early impacts on fall measures that would bias impact estimates on spring measures. See Appendix A for additional discussion.

[a]All estimates were obtained from a regression model of the outcome variable on an indicator variable of ERF grant receipt; grant application score; and an indicator variable of nonwhite, using SAS's PROC MIXED procedure. Language and literacy skill models also control for indicator variables of fall assessment taken in Spanish and missing fall assessment data and age at spring assessment. SCBE models also control for an indicator variable of missing fall SCBE data and age at spring SCBE observation. Missing values of covariates are mean-imputed by site and gender.

[b]The effect size was calculated by dividing the estimated impact by the standard deviation of the outcome measure (that is, the impact expressed as a percentage of the standard deviation).

NOTE: All figures were estimated by using sample weights to account for the sample and survey designs. Standard errors of the impact estimates account for design effects due to unequal weighting of the data and clustering at site and classroom level.

SOURCE: ERF spring child assessments and SCBE evaluations.

# Chapter 8. Analysis of Mediators of ERF's Impacts on Classroom Instructional Practice and Children's Language and Literacy Skills

Through its focus on teacher training and professional development, ERF seeks to improve language and literacy instruction in the classroom and, in turn, to improve children's language and early literacy skills. Chapter 6 of this report documents ERF's positive impacts on several measures of the classroom learning environment, and Chapter 7 documents ERF's positive impact on children's print and letter knowledge. In this chapter, we explore potential channels, or mediators, through which ERF generated its positive impacts on classroom and child outcomes. Unlike the impact analyses presented in previous chapters, this analysis is correlational, rather than quasi-experimental, because we cannot use the regression-discontinuity design to identify the causal effects of particular mediators. Consequently, any observed effect of mediators on child or classroom outcomes might be due to the effects of unobserved factors that happen to be correlated with these mediators, rather than to the mediators themselves.

## Models of Professional Development, Classroom Practice, and Children's Language and Literacy Skills

This report has shown that ERF had positive, statistically significant impacts on several classroom and teacher outcomes and on one child outcome. As shown in Chapter 7, ERF had positive impacts on the number of hours of professional development that teachers received and on the use of mentoring as a mode of training. ERF also had positive impacts on aspects of classroom environments and teacher practices that were major program focuses, including the language environment of the classroom, book-reading practices, the variety of phonological-awareness activities and children's engagement in them; materials and teaching practices to support print and letter knowledge and writing; and the extensiveness and recency of child-assessment practices. ERF also had positive impacts on other, more general aspects of classroom quality, including the quality of teacher-child interactions, the organization of the classroom, and the planning of activities for children. Finally, as shown in Chapter 7, ERF had a positive impact on children's print awareness.

For our analysis of the channels through which ERF generated positive impacts on classroom and child outcomes, we hypothesized that the additional hours of professional development attributable to ERF and the increased proportion of teachers receiving professional development through intensive, individualized mentoring account for at least some of ERF's impact on the classroom language and early literacy environment. The impacts on classroom environments, in turn, might account for at least some of the program's impacts on children's language and literacy skills.

To investigate this hypothesis, we first examine the extent to which hours of professional development and the use of mentoring as a mode of training are associated with the classroom outcomes affected by ERF. Table 8.1 shows the outcome variables that we examined and their associated potential mediators.

Table 8.1. Potential mediators of child and classroom outcomes

| Outcome | Potential mediators |
|---|---|
| **Classroom outcomes** | |
| Book-reading practices | Hours of professional development |
| | Whether received any training though mentoring |
| Number of phonological awareness activities | Hours of professional development |
| | Whether received any training though mentoring |
| Print and letter knowledge learning opportunities | Hours of professional development |
| | Whether received any training though mentoring |
| Written expression learning opportunities | Hours of professional development |
| | Whether received any training though mentoring |
| Classroom print environment | Hours of professional development |
| | Whether received any training though mentoring |
| Opportunities and materials for writing | Hours of professional development |
| | Whether received any training though mentoring |
| Oral language use by lead teacher | Hours of professional development |
| | Whether received any training though mentoring |
| Oral language use by assistant teacher | Hours of professional development |
| | Whether received any training though mentoring |
| Child portfolios | Hours of professional development |
| | Whether received any training though mentoring |
| Teacher sensitivity | Hours of professional development |
| | Whether received any training though mentoring |
| **Child outcomes** | |
| Print awareness, standard score | Book-reading practices |
| | Number of phonological awareness activities |
| | Print and letter knowledge learning opportunities |
| | Written-expression learning opportunities |
| | Classroom print environment |
| | Opportunities and materials for writing |
| | Child portfolios |
| | Teacher sensitivity |

We then examine the associations between classroom outcomes and the child outcome on which ERF had a positive impact—print and letter knowledge. The print awareness test used to measure skills in this domain requires children to recognize features of a book, to distinguish print from pictures, to recognize letters, and to associate sounds with letters. The development of these skills could be influenced by the extent to which teachers create or take advantage of opportunities for children to learn the sounds of letters, to learn to distinguish print from pictures, to learn about the sounds of words and parts of words, and to think about the shapes of letters and associate letter names with letter shapes. These skills are also supported by examples of print in the classroom environment and by the availability of materials for writing. Book-reading practices that include introducing features of the book and discussing those features may also help children acquire the skills needed for the print-awareness assessment. Teacher sensitivity and encouragement and regular, comprehensive assessment of children could also contribute to children's performance in this area (Landry 2005). Thus, as shown in Table 8.1, our model of print awareness includes as mediators the number of phonological awareness activities, print- and letter-knowledge learning opportunities, written-expression learning opportunities, the classroom print environment, opportunities and materials for writing, book-reading practices, child portfolios, and teacher sensitivity.

## Approach to Estimation

The estimation approach for the mediated analysis has four stages. In the *first* stage, we regress each potential mediator on an indicator of treatment status, grant applicant score, and additional covariates in order to obtain estimates of the impact of ERF on the potential mediator:

(1) $\quad M_i = b_0 + b_1 T + b_2 Score + X_M b_3 + e$

where $M_i$ is mediator $i$, $T$ is an indicator of treatment status, *Score* is the grant application score (normalized to have a mean of zero), $X_M$ is a vector of covariates, and $e$ is a random error term. Estimates are weighted to account for the sample and survey designs. The estimated coefficient $\hat{b}_1$ provides an estimate of ERF's impact on mediator $i$, which we denote as $I_{Mi}$.

In the *second* stage, we regress the outcome variable (child or classroom level) on an indicator for treatment status, *Score*, the potential mediating variables, and a set of exogenous explanatory variables:

(2) $\quad Y = \alpha_0 + \alpha_1 T + \alpha_2 Score + \sum_i M_i \gamma_i + X\beta + \varepsilon$

where $X$ is a vector of additional explanatory variables, $\varepsilon$ is a random error term, and the other variables are defined as above. Additional explanatory variables for the classroom-level analysis include teacher age, education, experience, and an indicator of whether the teacher was nonwhite, non-Hispanic. Additional explanatory variables for the child-level analysis include age at spring assessment and indicators of female; nonwhite, non-Hispanic; whether pretest was taken in Spanish; and whether pretest data are missing. Estimates are weighted to account for the sample and survey designs, and standard errors account for design effects that are due to unequal weighting of the data and clustering at the site level.

We then use the estimated coefficient on each mediator, $\hat{\gamma}_i$, as an estimate of the marginal effect of that mediator on the outcome variable, holding constant the other mediators and explanatory variables. It is important to keep in mind that since this model relies on cross-sectional rather than quasi-experimental variation, the estimated coefficients on the mediators represent correlations rather than causal effects. For instance, if any of the mediating variables included in the model are correlated with another mediator that also affects the outcome but is omitted from the model (for instance, teacher motivation), the true causal effect of that omitted variable on the outcome will be attributed to the estimated coefficients on the included mediators, leading them to be biased estimates of the causal effects of each individual mediator. Nonetheless, these estimates can provide useful descriptive information on the association between each mediator and the outcome variable of interest.

In the *third* stage of this analysis, we use the coefficient estimates from model (2) to compute what we term the "implied impacts" of each mediator on the outcome by multiplying the estimate of ERF's impact on mediator $i$ from equation (1), $I_{Mi}$, by the coefficient on that mediator from model (2), $\hat{\gamma}_i$. The implied impact of a particular mediator provides an estimate of change in the outcome variable that is attributable to the change that ERF caused in that particular mediating variable. This estimate may be biased, however, because it is unlikely that the relationships estimated between the mediators and the outcome variable in model (2) are true causal relationships.

In the *fourth* stage of this analysis, we compute ERF's total implied impact on the outcome variable, $I_Y$, as the sum of the implied impacts of ERF on each mediator, plus any residual treatment effects (represented by the estimated coefficient on treatment status, $\hat{\alpha}_1$, from model (2):

(3) $I_Y = \hat{\alpha}_1 + \sum_i I_{Mi}\hat{\gamma}_i$

We can then partition the estimate of ERF's total implied impact on the outcome variable into the percentage due to ERF's impact on each individual mediator and the percentage due to residual factors. Although the total implied impact on the outcome computed in (3) are not mathematically identical to the impacts estimates presented in Chapters 7 and 8, they are very close in practice.

## Results of the Analysis of Mediators of ERF's Impacts on Classroom Instructional Practice

We conducted the mediated analysis for 10 measures of classroom practice that were positively affected by ERF—book-reading practices, number of different phonological-awareness activities, print- and letter-knowledge learning opportunities, classroom-print environment, written-expression learning opportunities, opportunities and materials for writing, oral-language use by the lead teacher, oral-language use by the assistant teacher, child portfolios, and teacher sensitivity. Because the primary channels through which ERF aimed to improve language and literacy instruction were professional development and mentoring, the mediating variables that we explore for these classroom-level outcomes are hours of professional development and whether mentoring was provided as a mode of training.

Table 8.2 presents the results of the analysis of mediators of ERF's impacts on each of the 10 measures of classroom instructional practice that we examined. Overall, as shown in the "Total" column, the professional development and mentoring mediators explain less than 20 percent of the total implied impact estimates on each of the 10 measures of classroom practice that we examined; the two mediators are jointly statistically significant only for the child-portfolio and teacher-sensitivity models. For child portfolios, however, the two mediators do not account for any of the total implied impact on the outcome.

The estimated marginal effect of hours of professional development on each of the 10 measures is generally small and not statistically significant. The two exceptions are classroom print environment and teacher sensitivity, on which we estimate positive and statistically significant effects of professional development. Similarly, the estimated marginal effect of mentoring on each of the 10 outcomes is generally small and not statistically significant; the exceptions are negative and statistically significant estimates of the marginal effect of mentoring on child portfolios and teacher sensitivity. The mediators are jointly statistically significant only for child portfolios and teacher sensitivity.

Table 8.2. Hours of professional development as potential mediator of ERF's impacts on classroom instructional practice related to language and literacy

| Measures of instructional practice | Estimated marginal effect on instructional practice of: | | | Percentage of ERF's impact on classroom instructional measure associated with: | | Total percentage of ERF's impact on classroom instructional measure associated with professional development |
|---|---|---|---|---|---|---|
| | Professional development hours (p-value) | Received mentoring (p-value) | P-value of joint significance of mediators | Professional development hours | Received mentoring | |
| Book-reading practices | 0.00 (0.077) | 0.11 (0.510) | 0.113 | 6.50 | 5.45 | 11.95 |
| Number of different phonological awareness activities | 0.41 (0.285) | 0.00 (0.517) | 0.527 | 13.44 | −0.67 | 5.76 |
| Print and letter knowledge learning opportunities | 0.00 (0.626) | 0.24 (0.230) | 0.343 | 3.89 | 14.81 | 18.70 |
| Classroom print environment | 0.00 (0.029*) | −0.17 (0.340) | 0.065 | 33.93 | −16.67 | 17.25 |
| Written expression learning opportunities | 0.00 (0.127) | 0.22 (0.372) | 0.183 | 7.83 | 7.13 | 14.96 |
| Opportunities and material for writing | 0.00 (0.976) | 0.00 (0.350) | 0.649 | −0.19 | 3.21 | 3.03 |
| Oral language use by lead teacher | 0.17 (0.232) | 0.00 (0.427) | 0.283 | 11.84 | 4.56 | 16.40 |
| Oral language use by assistant teacher | 0.00 (0.796) | 0.24 (0.365) | 0.660 | −3.02 | 14.48 | 11.46 |
| Child portfolios | 0.29 (0.277) | −0.01 (0.000*) | 0.000* | 19.57 | −110.21 | −90.65 |
| Teacher sensitivity | 0.34 (0.005*) | 0.000 (0.012*) | 0.006* | 21.95 | −11.65 | 10.30 |
| Sample size (number of classrooms) | 133 | | | | | |

*p-value < 0.05, two-tailed test.
SOURCE: ERF spring Teacher Behavior Rating Scale and fall teacher survey.

## Results of the Analysis of Mediators of ERF's Impacts on Children's Print and Letter Knowledge

As shown in Chapter 7, ERF had a positive impact on children's print and letter knowledge. Table 8.3 presents the analysis of the potential mediators of ERF's impact on print and letter knowledge. As shown in this table, the estimated marginal effects on print and letter knowledge are not statistically significant for any of the potential mediators except print- and letter-knowledge learning opportunities, which account for 27 percent of the total implied impact on print awareness scores. Together, all eight mediators account for 60 percent of the total implied impact on print and letter knowledge and are jointly statistically significant at the 5 percent level.

Table 8.3. Potential mediators of ERF's impacts on print and letter knowledge

| Mediator | Estimated marginal effect of mediator on print and letter knowledge | P-value of estimated marginal effect* | Percentage of ERF's impact on print and letter knowledge associated with mediator |
|---|---|---|---|
| Book-reading practices | –0.22 | 0.731 | –4.15 |
| Number of phonological awareness activities | 0.38 | 0.424 | 12.12 |
| Print and letter knowledge learning opportunities | 1.56 | 0.048* | 26.97 |
| Written expression learning opportunities | 0.53 | 0.438 | 13.88 |
| Classroom print environment | 0.70 | 0.549 | 8.92 |
| Opportunities and material for writing | 0.29 | 0.821 | 7.73 |
| Child portfolios | 0.42 | 0.381 | 10.46 |
| Teacher sensitivity | –1.15 | 0.303 | –15.92 |
| Total | | 0.015* | 60.02 |
| Sample size (number of children) | 1,223 | | |

*p-value < 0.05, two-tailed test.
SOURCE: ERF spring Teacher Behavior Rating Scale and spring child assessments.